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The Role of the Einstein Library of Nova Southeastern University in Meeting the Needs of Distance Education Students

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The Role of the Einstein Library of Nova Southeastern University in Meeting the Needs of Distance Education Students

by

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We hereby certify that this dissertation, submitted by Anne K. Abate, conforms to acceptable standards and is fully adequate in scope and quality to fulfill the dissertation requirements for the degree of Doctor of Philosophy.

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Chapter I

Introduction

Relevance, Significance and Need for the Study

The academic library is traditionally viewed as the measure of quality of an educational institution. Accreditation standards often include the library as one measurable scale upon which to gauge the quality and acceptability of a college or university. The Southern Association of Colleges and Schools (SACS), for example, clearly states: "Library resources and services are essential to learning" (Southern Association of Colleges and School, 1988, p. 30). The academic library is a central element in the educational process for students, faculty, and administration. Recent advances in digital storage, multimedia applications, wireless communications, and high speed, high performance ATM (Asynchronous Transfer Mode) networks are altering services that can be provided by the library. Further, the relationship between the academic library and its parent institution is experiencing a noticeable change with the recent growth and popularity of distance education.

Distance education is not a new phenomenon. Verduin and Clark (1991) trace its use back to the late 1800's. They define distance education as "any formal approach to learning in which a majority of the instruction occurs while educator and learner are at a

distance from one another" (p. 8). Snyder and Starratt (1995) provide an even simpler definition: "distance learning is the delivery of formal courses and other continuing education opportunities to remote sites" (p. 317). Either of these definitions is broad enough to describe the majority of the distance education programs in place today.

Provision of avenues to students for distance education opportunities allows academic institutions to experiment with new delivery options and new types of programs. At the same time, distance education allows potential students to be more selective in their choice of institutions and courses of study. The university or college is no longer dependent on a place-bound student population. Students are no longer limited by their ability to live near a particular campus. Because of this new freedom, a larger and more diverse pool of students are seeking to improve themselves with higher education.

Distance education is on the edge of a period of explosive growth. This will be caused by the convergence of a number of factors. Colleges are looking for ways to add more students to their populations at little extra expense. Technological advances allow fast, reliable telecommunication at an affordable cost. And finally, the popularity of lifelong learning is increasing. A recent indication of impending growth in distance education is the development of the Western Governors University (Cushman, 1996; H. S. Smith, 1996). The governors of ten western states are working together to provide higher education at a distance without the benefits and services of an academic campus. The institution plans to seek accreditation later this year.

Large numbers of students are seeking higher education opportunities. This population is growing so quickly that traditional campuses are unable to accommodate

student services and educational requirements. Some of the explanations for this growth are detailed by Aguilar and Kascus (1991). They suggest that some institutions are turning to a new market of older students as the traditional college-age population is shrinking. Another explanation is the over-enrollment at existing institutions and the lack of adequate facilities caused by this situation. The developing capabilities of new technologies are also cited as an inspiring factor. Adult learners as well as traditional students recognize the value of higher education and are seeking new ways to attain it. For example, in a survey conducted by Washington State University, 81% of the respondents thought that obtaining higher education is necessary for their employment success (H. S. Smith, 1996). Computer communications technologies and the applications they support are accelerating the introduction of videoconferencing, Web-based instruction, and teletraining in the academic environment. All of the elements essential to the high quality distance education experience are in place.

In order to accommodate the projected expansion of distance education and telelearning programs, traditional services necessary to support the distance education student must be re-evaluated and new services must be introduced. Over the centuries, traditional campuses have been equipped with services such as libraries, recreational facilities, and laboratories to accommodate the needs of their traditional on-campus students. The developing distance education institution has not had the benefit of years of experience in order to test new services such as videoconferencing facilities, electronic libraries, and electronic mail communications that may be necessary to accommodate the unusual needs of the distance student population. This lack of adequate services to support the distance learner is reflected in the high drop-out rates experienced by distance

education institutions reported by Potashnik and Capper (1998) and Jones (1995). Library services are one of the critical support services that must be explored. This study provides a perspective on the current and future needs and requirements of the student in the distance education environment from the library perspective.

As distance education carries opportunities for students and academic institutions, it also presents challenges. The role of the library is changing to support the diverse needs of distance learning students. Some of these changes are made possible through the use of sophisticated telecommunications technologies such as ISDN (Integrated Services Digital Network) and ATM that facilitate fast and reliable access to online information resources. Academic libraries such as the six institutions involved in the Digital Library Initiative[1] are making electronic information sources available to students by creating an electronic library or digital library of source material (Schatz & Chen, 1996). The Digital Library Initiative is a government supported research project created to explore and advance the use of digital information in the research community.

Other examples of innovative paradigms supporting electronic delivery of information include the Computer Science-Technical Reports Project (CS-TR Project) organized by the Corporation for National Research Initiatives (CNRI) in 1992 (Kahn, 1995). The goal of this project is to provide network access to technical information in the field of computer science. The Canadian Initiative on Digital Libraries (CIDL) is a collaboration of Canadian libraries seeking to develop digital collections and services to provide access to Canadian digital library resources (Canadian Initiative on Digital

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1 Carnegie Mellon University, University of California at Berkeley, University of California at Santa Barbara, University of Illinois at Urbana-Champaign, University of Michigan, and Stanford University.

Libraries, 1997). In the United Kingdom, the Electronic Libraries Programme (eLib) is seeking to involve the higher education community in developing the future electronic library (Electronic Libraries Programme, 1997).

These projects demonstrate that the electronic library is taking many different shapes in the academic environment. Several of these innovative paradigms are investigated and described during the course of this research. This inquiry is designed to elucidate the significance of traditional and emerging library services in supporting effective distance education delivery. The important role of the library in the future of distance education is examined.

A request for further research in this area was recently presented by the Research Committee of the ACRL Extended Campus Library Services Section (Slade, 1995). Key research areas in that survey include: implementing new technologies to provide support for distance education students, creating models of library support systems, and evaluating the satisfaction level of faculty and the quality of library services that are provided to distance education students. All of these areas are explored in this investigation.

Problem and Goal Statement

The goal of this study is to evaluate the needs of a selected segment of the distance learning graduate student population served by the Einstein Library at Nova Southeastern University (NSU) in Fort Lauderdale, Florida and to propose a new model of library service based on the implementation of current and emerging technologies. Nova

Southeastern University (NSU) is an outstanding example for this study due to its strong tradition of serving off-campus students or students studying at a distance (Spyers-Duran, 1994). The University is also innovative in developing instructional support tools to service its distance education system (Levin & Simpson, 1996). The Einstein Library has a large population of off-campus students that it serves. Although some efforts have been made by the Einstein Library to help these students (Nova Southeastern University, 1995), the proposed model includes additional suggestions and guidelines for implementing new technologies for the benefit of the distance learning students.

Traditional library quality standards are changing. It is no longer possible to measure a library by the size of the collection or the number of student study carrels provided. A recent rating of Canadian universities ranked libraries in terms of total library holdings in millions of volumes, budget allocation for acquisitions, total library holdings per student, and budget allocation for expenses for maintaining library services (Reading, 1996). These measures of quality may no longer be adequate for the electronic library environment. New methods to measure service quality are being developed such as the "gaps" model described by White and Abels (1995). This model is based on comparing the gaps between client expectations and quality services, or between client specifications and actual service delivery, or between any measure of customer expectation and the actual service performance.

Unlike students in traditional on-campus academic environments, distance education students are often invisible users of the collections and services maintained by the library. These students are not physically present in the library on a regular basis and their use of library resources through remote means is not easy to document and measure.

Because distant students are not physically visible to the eyes of the librarians and library administration, it is difficult to calculate their particular and unique information requirements and to determine if those requirements are being adequately served.

In this dissertation inquiry, needs and requirements of remote learners are identified based upon the possibly conflicting opinions of the students, faculty, administration, and librarians of the institution. As noted by Lebowitz (1995), program development for distance students must begin with an assessment of student needs and an identification of the user group. Each user group views the library and its resources from a different perspective. While specifically surveying and studying student user needs, all outlooks on library service are considered. Specific service elements that impact assessment of overall library service quality such as reference and research assistance, book delivery, periodical article delivery, interlibrary loan, the use of research databases, and communication with the library are reviewed. Marketing efforts directed at the distance education population are examined. Services are of little value if they are not presented in an appropriate way to the potential audience. A particular emphasis is on the current use and future development of emerging technologies in the delivery of library service. The results of this study are useful to NSU's Einstein Library as it develops new services and readjusts support and staffing levels for existing programs and services.

The attitude of the faculty toward library service is measured in numerous studies. Several of these are in distance education environments. For example, Kabel, Moulden and Fritts (1995) surveyed the faculty in the distance programs at National-Louis University and equated the existing attitude of the faculty toward the library to their overall satisfaction with library service. The faculty can influence the attitudes of the

students and thus have an impact on the methods the students use to access information. Kabel et al. (1995) describe the close connection and concern of university faculty with library service. They surveyed the faculty to measure their awareness of a satisfaction with library services. They found that faculty place a high value on library service in the academic environment. Faculty members are frequent users of information resources and utilize libraries throughout their academic careers. It is clear that their opinions regarding the status and efficacy of library services impacts their use of library resources in and out of the classroom.

In comparing faculty and student survey results in this dissertation inquiry, the actual impact of this relationship on the attitude of the students is defined. These results can indicate to library staff and administration the importance of focusing more of its marketing efforts on the faculty in order to improve the library's access to the students.

In addition to surveying the current needs and attitudes of the user population, the role of the library and the librarians is also examined. The librarian functions in a variety of roles. The traditional roles of the librarian as seen by users range from answering reference questions (Carson, 1996) to the technical tasks of cataloging and acquisitions along with advising readers and recommending sources (Behrens, 1996). The librarian's traditional role has recently been questioned by several authors. Flagg (1996) reports on some programs held at a recent library conference that highlight the changing role of the librarians brought on by new methods of accessing information. He describes programs on managing technological change, project management, the social impact of new information technologies and the integration of multimedia materials into citation based library catalogs. New technologies are causing this change in the librarian's outlook.

Young (1996) discusses the future of librarianship as the transition is made from the modern to the postmodern age. He sees a new paradigm for librarianship developing with the accelerating use of digital technology to create, store, and deliver information. Librarians must learn to accommodate new electronic media in their procedures, services, and principles. Specifically, the interactive nature of the new information technologies requires a new approach to library service in order to adapt to the volatile nature of information accessible through technological methods. Dowlin and Shapiro (1996) view public librarians as "incubator[s] for future programs built around the use of information and communication technology" and creators of the "global village library network" (p. 176). Similar innovative roles are later delineated for academic librarians.

Based on the outcomes of this research, a model of library service to meet the needs of the distance education student and faculty is proposed. There are currently two main approaches to the delivery of distance education that are explained by Duffy (1994). Traditional campus institutions are developing distance education programs as a supplement to their on-campus programs in order to meet a wider and perhaps larger student population. There are many examples of colleges and universities taking this approach. For instance, the University of Kentucky has added various distance education programs to its course offerings that are described by Baird and Vaughan (1995). While distance education students share some of the same academic needs with traditional on-campus students including access to information resources, assistance in their search for information, and adequate methods to locate information, they also have different needs that originate because of their unique circumstances. These include delivery of resources from remote locations, alternative forms and formats of communicating, and assistance in

forming relationships with local libraries or information providers. Needs such as access to resources and services and sources for academic collaboration must be evaluated and served by academic institutions that develop distance education programs in addition to traditional on-campus programs.

The other approach is the non-campus program of higher education. Examples of such programs include New University and the Union Institute that are both described by Verduin and Clark (1991) in their comprehensive treatise on distance education programs. Another example is Athena University that brings together faculty from other institutions to educate students in a completely electronic environment (Athena, 1997). These programs attempt to educate students without the support facilities and resources of a traditional campus institution. The new models that are used by these non-campus programs to provide students with the resources that they require are explored during this research as well. The approach to accessing information resources taken by this new style of academic organization could serve as an interesting example for the more traditional libraries in schools that include Nova Southeastern University.

The services currently provided by the Einstein Library of NSU through its Electronic Library (EL) are characteristic of traditional library services. These include access to the library collection of books and periodicals through an online catalog, access to bibliographic information from other libraries, database searching in commercial databases, the ability to contact a reference librarian for research assistance, and interlibrary loan (What is the Electronic Library, n.d.). Examples of innovative library services and new approaches to library service from other institutions are explored in this study.

Barriers and Issues

In this study, the researcher focuses on the current status of one library, the Einstein Library at Nova Southeastern University, and the distance learning graduate student population in several selected programs. Nova Southeastern University serves a graduate student population of more than 10,000 (E. A. McDaniel, personal communication, July 26, 1996), as well as undergraduate, administrative, staff, and faculty groups. Therefore, in addition to specifically surveying a selected segment of the user population regarding their needs, any recommendation for the future of the library and its services must also take into consideration the wider population of the library's user community and the overall mission of the Einstein Library. Planning documents for the Einstein Library that are prepared by the librarians and consultants are reviewed. General demographic information on the participants in the survey are gathered and evaluated. Preconceptions that are brought into the investigation are identified. The previous library experience of the students and faculty as well as the library education and experience of librarians also impact their views of distance learning support. This influence is studied by Craig and DuFord (1995) at Central Michigan University. They found that the attitude of the faculty toward library service is determined by their own personal experiences in acquiring library skills.

The previous library experiences of the faculty are a particularly important factor as this framework has formed their opinions regarding all libraries and, thus, the Einstein Library. While librarians at NSU cannot remove attitudes developed in decades past, through marketing and presentations to the faculty, they may be able to educate the

faculty and enhance their preconceptions of the services that are provided by a contemporary library. The influence and potential impact of the librarians are critical components when developing the model of future library service.

The effect of the expanding use of the Internet, multimedia resources, and other new technologies on the library is still not entirely clear. The development of modern library services is an evolving process. This single study in one institution cannot completely predict all of the elements that impact the future of libraries. All libraries cannot afford to take advantage of every technological enhancement as it becomes available. Cline (1993) describes the choices that were made in selecting various ways to access information at Pennsylvania State University. She describes the balance between available sources and formats, user needs, and costs. These decisions were difficult, but were always focused on the needs of the users. This decision-making process is described as "managing information technology" by Charkes (1995). A series of choices are made in presenting the appropriate technology to the user. Incorporating emerging technology into the library infrastructure to support delivery of quality library service lies in the future of the library profession and new models must be developed to provide direction.

The largest barrier to be confronted in this study is time. Access to electronic information is changing at an accelerating rate. New research techniques such as search engines to access information on the World Wide Web[2] (Schatz, Mischo, Cole, Hardin & Bishop, 1996), the use of Internet protocols within organizational networks, and access to digital editions of standard reference tools (Dunlop, 1996) are being devised. Some of

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[2] Also known as WWW or the Web.

these new methods are explored in this report as potential elements of a model of future library service. It is impossible to predict the future of electronic access to information. As these changes take place, library needs of students are also changing. Any solutions proposed here are for a very small window of time, perhaps only for two to three years. They must be reexamined periodically with all of the new developments taken into consideration. The evolution of library service is a continuous process.

Research Issues Investigated

Student Access to Technology

While directly surveying the students regarding their use of information, it is necessary to assess their use of other technologies as well as their access to these technologies. The use of such existing and emerging technologies as electronic mail, the Internet, and the Web influence the students' attitude toward information gathering and their acceptance of newer ways of looking at information. While students may be able to spend time locating useful information on the Web, some businesses and organizations are coming to see it as a huge waste of time and are limiting the use of the Web by employees (Wilson, 1997). For example, an article in the *Detroit News* reports on Internet abuses such as listing used automobiles for sale, vacation planning through online discussion groups, and posting resumes on the Internet by Michigan state government employees. The author predicts that the state government may block access of employees who abuse the system (Bebow, 1996). Products are being developed to assist employers in blocking or monitoring employee use of the Internet such as

SurfWatch and NetNanny that monitor for unsuitable content (Jackson, 1996), Surfcontrol that limits the amount of time spent online ("Or get nailed," 1996), and NetPartners that combines monitoring and blocking software (Wilson, 1997). These products are deployed in the learning environment as well (Burton, 1995). Weiss recommends that companies develop policies and rules to prevent employee abuse of access to Internet resources (B. D. Weiss, 1996).

In the same way that business and government are developing policies and programs to regulate ineffective use of Internet resources, academic institutions are reconsidering the value of Internet access as well. Although students may be accessing the Internet for information, they may actually not use this new resource effectively. For example, Anderson (1995) found in a survey of student users of online search systems that they still rely on simple searching even when presented with more advanced search techniques. A discussion of this assessment of student use of technology is included in this report as well.

Future of Library Service

Authority control is a library function that deals with establishing a common language or terminology for a subject area. A simple example of authority control is a standardized list of terms or controlled vocabulary used in searching a bibliographic database. Another example is the Library of Congress Subject Headings. One formal body, the Library of Congress, established a common terminology for all knowledge and continues to expand this system. Everything that is written must fit into their schema or new terminology is added. Such standardized listings are developed so that searchers will

be able to locate items of interest. In these lists, like terms are grouped together to facilitate end user searching and retrieval.

Another newer example of authority control is the Yahoo search engine on the Web. The developers of Yahoo are attempting to classify all of human knowledge into a select number of categories in order to simplify the search for home pages on the Web. A report by Janes and Rosenfeld (1996) describes some of the guides to the Internet that are being developed and indicates the complexity of this task. Subject-oriented guides can be produced to identify relevant information and resources available on the Internet pertaining to a specific topic. These may contain not only links to the resources, but also evaluations of their usefulness. The authors point out the difficulty of this task when working with the moving target that is the Internet.

Authority control is the basis of library organization and traditional library research methods. Mann (1993) suggests it as the basis for his "traditional library science model." He explains that the purpose of a library catalog is to establish a standard way of referring to persons or subjects that may have different name forms or different words to describe the same subject. In an interesting attempt to apply the concept of library authority control onto the larger world of the Internet, Micco (1996) describes and envisions various methods to bring subject authority control to everyone that puts information out onto the Internet. In her design, all authors contribute controlled subject terms and recognizable file names for all documents that they publish or post to the Internet. According to Micco, these procedures facilitate the search and retrieval process.

The quantity of information that is currently accumulating on the Internet and the World Wide Web is described by one author as the “floodgates of the Internet” (List,

1995). As a consequence, better methods to organize and locate information are needed. In this study, the methods used by researchers to locate information on the Internet and in libraries are explored. This study defines the principles of organizing digital environments. These principles will assist librarians as they attempt to organize knowledge in digital formats just as they have been organizing information in physical formats over many decades.

Limitations and Delimitations of the Study

This investigation is limited to a select population of one institution. Services provided to students have a distinct impact on what the students think of the library and where they go for other sources of information. A similar study conducted in another population may yield different results. This study is also limited to a fairly sophisticated graduate student population. As described by Feasley (1993), students in distance education programs have already made a commitment to the technology. They should be comfortable with emerging trends in telecommunications or computers. This study is not fully generalizable to the larger user population nor even to an undergraduate population although the patterns of information seeking behavior uncovered through the survey could reveal future trends in usage patterns by all library patrons. This study must be viewed carefully for its limited scope.

This study is delimited to students in several programs at Nova Southeastern University. The size of this population is significant to obtain a general view of how students are accessing information to complete their work. However, it is limited to

students in the selected general subject disciplines. Attitudes of researchers in other disciplines may be different and merit further study.

Definition of Terms

Distance Education

The definition of distance education considered here is that provided by Verduin and Clark (1991). According to these authors, distance education is "any formal approach to learning in which a majority of the instruction occurs while educator and learner are at a distance from one another" (p. 8). This would include campus-based programs in which students spend some of their time on a traditional academic campus. It would also include programs that are not campus-based in which students communicate with their instructors and administrators entirely through electronic means. The term used for this example is off-campus education. Distance learning is used as a synonym for distance education, although this also applies when used in the context of the student activity of learning.

Library Services

Library services are strictly defined as those services provided to the students and faculty directly through the campus library. These are services selected and maintained by librarians for use by students and faculty. There are also services for which some level of training is provided by the library, or for which the library acknowledges that it could provide training. As shown, there are many other sources of information that are used by

students that do not fall under this strict definition of library services. Extended campus library services is the terminology used by the Association of College and Research Libraries (ACRL) for "those services offered in support of academic courses and programs offered away from the main campus" (Pickett, 1990, p. 354). The library services offered in the distance education programs discussed here fall under this definition, but the shorter term "library services" is always used.

Virtual Library / Electronic Library

Other terms that are used when discussing library services are virtual library and electronic library. The virtual library is the entire universe of knowledge that would be available to students with complete access to electronic and print resources. While some electronic services may be included in the library services of a university, the virtual library is a much larger concept. It is formally defined by Gapen (1993) as:

> The concept of remote access to the contents and services of libraries and other information resources, combining an on-site collection of current and heavily used materials in both print and electronic form, with an electronic network which provides access to, and delivery from, external worldwide library and commercial information and knowledge sources (p. 1).

The electronic library includes those sources of information that are available in an electronic format. This may encompass library catalogs, bibliographic databases, and full text sources. A synonym for electronic library is digital library.

Needs Assessment

This study includes a needs assessment in the form of a survey. Needs assessment is a method or process to measure the information requirements of the students. These

requirements may not be what the students actually need, but rather the students' own view of what they need. The faculty or administration may have an entirely different view of what the students need. For this study, the opinion of the students regarding their needs is explored.

Remote Access

Remote access is electronic access to the collections and services of a library from a location that is physically remote or distant from the actual library. Through remote access, libraries open their collection to an entire campus or to users anywhere on a network.

Quality Function Deployment

Quality function deployment (QFD) is a methodology used to assemble information on the needs of users or customers. Through the use of graphical matrices, QFD represents the needs of the user in a way that can be interpreted to increase services to meet those needs. Described by Quinlan and Byrne (1995) as "a disciplined planning method" (p. 100), QFD is a tool that can transform basic user needs into system or program requirements.

Model

The goal of this study is to develop a model of library service. A model is defined by Whitten, Bentley, and Barlow (1994) as " . . . a representation of reality . . . most models are graphical representations of reality" (p. 272). Model is defined here as an

outline of the elements necessary to structure a service. The model cannot define specific products or services that should be acquired or made available. Rather, it forms a sketch of the ideal world in which the library should be operating in order to have the most impact and provide the best level of service for the students and faculty.

Summary

Emerging technologies are enabling new directions in acquiring, organizing, and maintaining information. Librarians traditionally perform these tasks. Librarians in academic institutions have carried out these duties for their service communities. Although distance education has a long history, new methods and media for educating students at a distance are introducing additional challenges for libraries and librarians. A new model of library service is needed to incorporate emerging technologies in serving distant students. The views of the students are an important tool in shaping the model. The support and cooperation of the faculty is also an important consideration in integrating a new model of library service into the overall academic experience.

Chapter II

Review of the Literature

Introduction

This investigation crosses over several subject disciplines that frequently intersect. Distance education is the realm of educators, technologists, and accrediting bodies. Among the support services required to facilitate distance education are counseling, administration, library and information resource services, management, and telecommunications. Studies associated with library services and the electronic library are found in library literature and technical literature dealing with the format and delivery of digital resources. Surveys are used extensively in consumer research, but they are also important in the service industries and in libraries. The same is true for methodologies to enhance quality. Model building, an important systems development technique, can apply to many types of systems including libraries. Thus, background information for this inquiry is derived from multiple sources. Literature searches were performed on an ongoing basis during this study in a variety of databases including ABI-Inform, Social Scisearch, LISA, Infosciabs. Additionally, literature searches in the Magazine and Computer databases on the Westlaw system, and the Nexis News Library on Lexis/Nexis were performed in order to identify key resources.

Distance Education

Educating students at a distance has had a long historical development from early correspondence courses to modern videoconferencing techniques. Key instructional and descriptive books have been published to assist institutions that are interested in pursuing this educational path. Verduin and Clark (1991) provide a general introduction to distance education with examples of many successful programs. They also include practical suggestions for implementing distance education.

Keegan (1990) explores some of the theoretical bases of distance education while spending quite some effort on developing an appropriate, all-encompassing definition of distance education. Kubala (1998) provides a faculty member's perspective of the distance education experience. Finally, Willis (1993) provides a short overview of the field and practical advice on setting up a distance program and teaching students at a distance.

A common difficulty of these and other general works on distance education is the lack of adequate consideration by the authors of the support services that may be needed by students studying at a distance. Support services are those that go beyond general instruction such as advising, career counseling, and library service. Cookson (1989) stresses the importance of support services in distance education while reviewing attrition rates of distance learners, but does not include libraries or information services in the list of support services. In fact, the one critical support service that is rarely mentioned in the general texts and articles on distance education techniques is the provision of library service to distance education students.

Library Service in Distance Education Environments

While general works on distance education seem to pass over the importance of libraries in the process (Carrigan, 1995), there has been research conducted on the specific needs of distance education programs and students. The literature in the area of library service to distance learners has increased in the last decade. A bibliography published by Latham, Slade and Budnick (1991) details more than 500 sources on library services to distance learners. The new edition of this bibliography published in the spring of 1996 details an additional 518 references in this area, more than 400 of which were published since 1989 (Slade & Kascus, 1996).

Guidelines for library service in extended campus situations are established by the Association of College and Research Libraries (ACRL). The full standards are provided by Pickett (1990). The guidelines cover philosophy, management, finances, personnel, facilities, resources, and services and also provide definitions for extended campus library services, extended campus community, parent institution, and library. These standards are goals that all programs strive to attain.

Another basic source of research in this area is reflected in the Off-Campus Library Services Conference that is held every few years. The seventh conference took place in the fall of 1995 (Jacob, 1995). The proceedings from this conference include reports of many studies on user needs, faculty attitudes, and equity in library services. One of the more interesting papers from these conferences is Lange and Farr's overview of the planning process taking place at the University of Wyoming to support distance programs (Lange & Farr, 1995). In this paper, the authors outline the elements of the virtual library

that they are striving to develop. Baird and Vaughan (1995) describe various distance learning opportunities available through the University of Kentucky such as interactive video, satellite delivery, and videotape delivery and detail the services provided by the library to support these programs. This is another example of the variety of methods that can be used to reach distance students.

Pettingill (1995) reviews the library program at Old Dominion University that is seeking to provide additional support needed by distance students. Possible products and enhancements are described such as improved access, library instruction including the use of hypertext tools, and expansion of the CD-ROM network and online system. The planning process used at Old Dominion is described in detail. The plan centers on communication as a key element in the delivery of library services.

An entire issue of *Library Trends* published in 1991 (Aguilar & Kascus, 1991b) is devoted to off-campus or distance education programs. Kopp (1991) explores the current uses of technology in the delivery of library service including voice, data, and video applications. LaBrake-Harrison (1991) discusses the future of rapid technological change in the area and provides a good definition of extended library service. Lessin (1991) proposes several different models of library service illustrating there can be more than one successful way to meet the needs of the students. In the same issue, Simmons (1991) describes accreditation issues and provides the opinions of the accrediting agencies, including the Southern Association of Colleges and Schools (SACS), on library support for distance education. The specific aspects of library service and possible solutions to the difficulties of providing library services in a distance education environment are indicated. For example, collections, bibliographic instruction, and staffing are considered

but reaching beyond these basic levels of support, alternative delivery systems, faculty involvement, and information literacy are also discussed. The important and developing issue of service equity between on-campus and distance students is also explored by Simmons (1991).

Authors such as Cutright (1993) view technology as an opportunity to improve library services provided to the distance student. Through the use of remote access to CD-ROM indexes, interlibrary loan, and electronic mail, librarians can implement enriched programs for their remote clientele. Adams (1995) predicts that library resource allocation will change as a result of analyses of the usage patterns of distant students. In order to integrate improved services into the overall model of a complete library service structure, librarians must be prepared to evaluate and document the needs and expectations of remote students in the implementation of emerging technologies such as full text digital databases, electronic document delivery services, and educational mediabanks in order to improve library service.

The impact of technology on learning is explored by Chadwick (1995) who provides multiple examples of programs in the United States and United Kingdom. For instance, Chadwick describes an accredited distance program in Library Science at Syracuse University in which all course delivery is accomplished through electronic communication. He also reports on a program at the University of Memphis that utilizes the services of a commercial provider, CompuServe, for electronic communication among students in the journalism program. Further, he describes the pioneer in the field, the Open University in the United Kingdom, and its methods of multimedia distance teaching. At the Open University, a mix of printed materials, videos, CD-ROMs, and

computer-mediated communication are used in program delivery. Initiated at Open University, the JANUS (Joint Academic Network Using Satellites) project is a prototype satellite-based network linking sites at universities throughout Europe.

Pease and Power (1994) also look at the implications of technology and other issues involved in establishing and maintaining equitable reference services for off-campus programs. They determine that the use of computers and communications technologies can bring equity to the services provided to distant students. However, they also find that using these emerging technologies will force librarians to reexamine services they traditionally provide.

The impact of technology on teaching and learning is significant. Fulton (1998) stresses the integral role of technological fluency that is becoming the information literacy of the Internet. She determines that students and teachers must have the necessary skills to adapt to the new technological learning environment.

This increasing impact of technology has an even more pronounced influence on the library and the delivery of library service. Technology has had a place in libraries since the early development of the automated catalog (Young, 1996). Although this influence was not felt directly by users until the last few years, libraries were early adopters of computing technology for their back office operations. Heaney (1995) describes the format of some of these early automated indexing systems. Electronic cataloging practices have become so basic to library service that currently many libraries rely totally upon technology to organize their collections or provide service to patrons (see Buckland, 1992). This is particularly true among major academic libraries (see Lynch, 1995). With the broad base of library automation already in place behind the scenes in libraries, the

more recent introduction of technology to the larger audience of library users is allowing the established network of library cataloging information to serve as a gateway to the resources at many distant libraries. The free and unrestricted access to the Internet that is available to most students is extending their information reach to libraries throughout the world. As described by Feller (1995), the walls of an individual library are broken down so that universal library access is now a reality in many academic institutions. The impact of such universal access to all types of information resources is even more significant for students in the distance education environment who have traditionally been limited in their access to standard sources of information because of their lack of physical access to the campus library.

Rather than highlighting the library as just one more important support service, Snyder and Starratt (1995) suggest that the library should be the heart of the distance learning infrastructure due to its organization, ability to cope with technology, and other qualities necessary to manage distance education efforts. According to these authors, the library should control the activity of distance learning. They further state that this expanded role of the librarians in distance learning will allow them to expand the services of the library and become the primary support vehicle for distance education students. The qualities listed that place librarians in a leadership position are knowledge and experience, effectiveness, leadership, technology planning, and cooperation.

Nova Southeastern University has been particularly concerned with library services provided to the distance learning student population. As part of the reaccreditation process, Nova Southeastern University has identified library access for students in off-campus, field-based programs as one of the four major goals for the Einstein Library

(Nova Southeastern University, 1995). A vision statement written for the Library in 1994 by Spyers-Duran predicts "an appropriate functional reorganization" of the university libraries in order to bring them into agreement with the vision of the University (Spyers-Duran, 1994, p. 2). This study provides a foundation and structure for the ongoing expansion and reorganization of the library.

While it is understood that on-campus students also need strong library services, distance students may face more serious burdens that are difficult to conquer. Pettingill cites "telecommunications facilities, equipment, site conditions, area libraries, educational background, and previous library experience" as well as isolation from others as factors that have an impact on the distance student (Pettingill, 1995, p. 303). The library must take these special conditions into consideration when developing its programs to serve the distance education population. Creation of new models to improve these conditions benefits the on-campus students as well.

Distance education and the function of the library in the academic structure of distance education programs are popular topics in the online world. As an example of this interest, several Internet discussion lists[1] are devoted to these subjects. The Distance Education Online Symposium (DEOS) includes a weekly journal about distance education as well as an international discussion forum on the issues in the news of interest to distance educators ("You are now subscribed," 1996).

The CRISTAL-ED project (Kellogg Coalition on Reinventing Information Science, Technology, and Library Education) sponsors another Internet discussion list devoted to

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1 Commonly know as "listservs" because of the major software package used to administer this type of discussion list, Internet discussion lists are extremely popular among all types of librarians.

the impact of technology on the future of libraries ("Welcome," 1995). Distance learning and lifelong learning are common topics on this list. This researcher acted as a moderator of the CRISTAL-ED list for a two-week discussion on surveying user needs in June 1996. The discussion generated during this brief period indicated some of the problems that are unavoidable in surveying the needs of library users and provided some interesting opinions from the discussion group on the validity of library use studies. For example, one contributor suggested that users are suspicious of surveys that might hurt their work by resulting in changes to existing services (M.G. Slusser, personal correspondence, June 19, 1996). Another respondent recommended careful design of the survey in order to entice the user to answer in order to obtain higher response rates (J. H. Sweetland, personal correspondence, June 24, 1996). A third contributor suggested that in selecting user measures: "infrastructure, access, and use especially in electronic communications environment . . . should be considered critical" (B. Speller, personal correspondence, June 24, 1996).

To a great extent, the importance of the library to the academic environment is understated in the literature outside the specific field of library and information science. This fact is noted by Corrigan (1995) in his study of the relationship between distance programs, which he calls external degree programs, and libraries. He compares the large amount of discussion in the library literature on supporting distance education to the much less frequent mention in the literature outside the library field. Librarians regard library service as an essential component of a distance education program (see, e.g., Pettingill, 1995), while those outside the library field barely mention library services when outlining the important factors in distance education (see, e.g., Berge & Collins,

1995; Harasim, 1990; Harasim, Hilty, Teles & Turoff, 1995; or Willis, 1993). This inconsistency may be tied to faculty attitude and support for library programs that is one explanation this current study seeks to uncover.

Changes in Library Services

Library literature in the areas of user satisfaction, collection development, and the use of technology for providing service to all types of patrons in each type of library is extensive. Librarians study the needs of their patrons and attempt new methods to measure those needs. Meldrem, Johnson and Ury (1995) describe efforts at one small library, Owens Library at Northwest Missouri State University, to implement changes based upon input from users. The librarians of the Owens Library made specific changes influenced by the comments from the users regarding reference services, library instruction, and circulation services.

The study of emerging technologies in libraries is particularly well documented in the literature. Young (1996) suggests that digital computing is having such a large influence on libraries that there is no longer a library or a librarian that is not affected. Several works on emerging technologies in libraries have examined technology as either an opportunity or a danger. On the opportunity side, the University of Illinois at Champaign-Urbana holds an annual Clinic on Library Applications of Data Processing (e.g., Bishop, 1993; Sutton, 1994). Contributors to these sessions such as Garrison (1994), Larsen (1994), and Marchand (1993) see the tremendous possibilities of a networked world and electronic texts. Larsen, in particular, describes technologies and

networks as inevitable solutions in the academic environment that enable rather than augment library services.

Crawford and Gorman (1995), on the other hand, warn that any moves toward the electronic virtual library can have a devastating effect on the cultural institution of the library. They claim that economic and societal models do not support electronic distribution and by moving in this direction, librarians are destroying their traditional roles and image.

List (1995) also adds a word of caution by suggesting that the Internet might actually provide too much information for some users thereby leading to information overload. This article attempts to put the Internet into perspective for librarians. A modest technological progression leading from simple searching and bibliographic instruction to full Internet search techniques is recommended. According to List, librarians should provide instruction in existing sources before overwhelming users with the information available on the Internet. At the same time, the author encourages librarians to stay abreast of technological developments in order to serve in a leadership position. The debate among librarians continues even as technology evolves and the electronic library emerges.

Digital Libraries

The digital library is defined by Schatz and Chen (1996) as a place to "basically store materials in electronic format and manipulate large collections of those materials effectively" (p. 22). University libraries provide access to digital libraries in order to

broaden and expand upon the resources that can be made available to students through their core book collections (Kijanka, 1993).

According to Covi and Kling (1996), there are effective uses for digital libraries involving the following domains: connectivity, content, usability, and research. Additionally, special features of locally produced digital libraries can be highlighted and organizational arrangements can be designed in order to make effective use of digital libraries. While these are good areas of effective use, they also serve as subheadings in a QFD matrix developed as an outcome of this dissertation inquiry. Because they will be used later in developing the QFD matrix, the key features identified by Covi and Kling are reviewed in detail in the material that follows.

Connectivity is the general ability to be able to reach the resources of a network. An effective digital library is reachable at any time and accessible anywhere faculty and students are located. Effective use of information technology also implies acquiring technical skills necessary to be able to connect to the system and utilize its resources.

Content continues to be the basis of any digital collection just as it has been the basis of traditional book and periodical library collections. There must be useful content in order to draw people into using a digital library. Content is also what brings people back to use the collection again.

Usability goes beyond the ability to connect and use the system. In order to support the research needs of faculty and students, issues of human computer interface design, help menus, formatting and documentation must be considered.

Digital libraries that are broken down into specific research areas which assist in locating relevant information allow the researcher to go beyond the basic files provided

on the system. Properly constructed digital libraries provide a depth of coverage and a good classification of information. They provide more than just flat text and content. They break information down into levels that can be explored by the researcher.

Special features such as graphical content and hypertext links make a digital library more interesting and useful to the researcher. These features can be added by the local information providers or the librarian in order to make the digital library more worthwhile for the home audience. For example, sources that are available in a local library can be highlighted for the user. Other features may be incorporated into the source material when it is developed such as hyperlinks from a World Wide Web HTML (Hypertext Markup Language) document to other relevant sources on the Internet.

Organizational arrangements and enhancements can also be provided by the host of the digital library. Again, these may have individual characteristics based upon the content of the file and the specific user population. This is a specific way in which a library can provide additional services to the users of digital library resources.

The Electronic Library

The concept of electronic delivery of information resources was still a novelty to academic librarians in 1988 (Okerson, 1988). Although a fairly new development, there is a significant body of literature on the electronic or digital library. Libraries are seeking ways to use emerging technologies to enhance their services and reach beyond their physical collections to provide more extensive resources for their patrons. Arms (1990) collects some early institutional portraits that illustrate the approaches to the electronic

library taken by a number of institutions including Northwestern University, the University of Illinois at Urbana-Champaign, and the University of Southern California. Arms also reports the current status of electronic library development at the library service companies such as OCLC[2] and the Research Libraries Group (RLG). Cline (1993) describes remote access to library catalogs that has afforded users 24-hour access to library catalogs and other online resources offered by the library. Birdsall (1994) looks at the myth of the electronic library from the political, cultural, and social perspectives and predicts a strong position for the library and librarians if they are able to adapt to the new roles that will emerge along with the technologies of the electronic library.

Electronic journals are a new and emerging development among library products and services. In a 1994 survey conducted by the Association of Research Libraries (ARL) (Parang & Saunders, 1994), only 46% of the ARL institutions made electronic journals available to their users. However, 80% of those institutions that were not making electronic journals available at the time of the survey were considering the possibility of providing such access in the future. Although this study has not been repeated recently, there is clearly a strong move among academic libraries to provide access to electronic journals. This same study also shows a state of confusion in the ARL libraries regarding how to cope with this new scholarly medium. The level of library staff within the organization that selects, orders, and processes the electronic products is not well defined among the libraries surveyed.

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2 OCLC started in the 1960s as the Ohio College Library Center. In the 1970s the name was changed to the Online College Library Center, and later to simply OCLC. Currently, OCLC is an acronym that does not represent anything else.

There are several recent studies on the impact of electronic publishing on scholarly research. In a 1996 study published in the electronic journal, *Public-Access Computer Systems Review*, Harter (1996) reports on the impact that several electronic journals have on their respective disciplines. He finds this impact to be insignificant. His results reveal that only eight out of 39 electronic journals studied are cited 10 or more times since they began publication. This is a key finding. If scholars are not using electronic journals in their research, these sources cannot develop the reputations that they need to be widely used and cited by students. More research is required on the acceptance of electronic publishing in academia.

Many universities are developing digital libraries that serve as examples for this new model of library service. The best place to look for new ideas and innovative approaches to the electronic library are some of the actual implementations of electronic library service in academic institutions. For example, the library at Dartmouth College works together with the Computing Service Department of the College to provide the Dartmouth College Information System (DCIS/WWW, 1996). This system fully integrates library resources with other information needs of students such as housing listings, job opportunities, and administrative information of the College. In this way, a single seamless information resource is provided for the students.

The UCLA Library has developed an integrated guide that includes its own collections as well as the broad resources of the Internet that are presented to patrons in a directory classified by subject disciplines (UCLA Library, 1997). The Library serves as the gateway to the Internet while not ignoring the wealth of its local collections. The University of Chicago Library has developed a Working Plan for Digital Information

(1997). The Library acknowledges the new academic environment in which both print and digital resources must be utilized. The Working Plan for Digital Information outlines goals, objectives, and strategies that will assist the Library as it moves into this new environment.

Another innovative approach is taken in the Electronic Text Center (ETC) at New York University (The Electronic Text Center, 1996). Through the ETC, the Elmer Holmes Bobst Library is providing research access to electronic texts and databases, thereby placing the Library in the position of a prime resource and information center for many types of digital information sources. These examples of the electronic library paradigm contribute to the development of a new model of library service that is featured in this study.

Emerging Technologies in the Library

Some applications of emerging technologies are implemented at Cornell University's Mann Library to bring that library into the center of the networked information community (Garrison, 1994). The Mann Library is providing access to networked information along with instruction to the university community in its use. These developments allow the library to experiment with new platforms and technologies. The Mann Library has become a manager rather than a user of networked information. This is also forcing the library staff to update their technical knowledge in areas of telecommunications and networking in order to maintain access to the networked information environment.

Chrzastowski (1995) examines the changing behavior of students when presented with computer research options. The study took place in the Chemistry Library at the University of Illinois at Urbana-Champaign. According to Chrzastowski, users are more willing to use online information retrieval than paper index sources. But the study also shows overall increased use of library services including reference and circulation. This research demonstrates how library research as well as other services to library users change as students and other users adapt themselves to new methods of conducting library research.

In another example of helping students adapt to changing research patterns, Koopman and Hay (1996) provide an interesting description of a Web browser interface that was developed as the main access point to the library at Indiana University-Purdue University Indianapolis. They emphasize the importance of patron education when introducing any new technology in the library environment. These and other technological developments are contributing to a newly defined role for library professionals. As will be explored more fully later, librarians can no longer be keepers of materials, but must emerge into a new role as guides to information in all formats.

It is important at this point to gauge how the needs of users change in proportion to their access to technology. As Paepcke et al. (1996) found, when presented with multiple research options, a variety of search engines, or multiple interfaces, users can become confused. These authors develop an information access protocol that provides a uniform search interface which operates on commercial services such as Dialog, as well as with the Internet search engine, WebCrawler, in order to create a high level of interoperability between standard or more accepted information research tools and new mechanisms for

research on the Web. They applied distributed object technology to implement the interactive library in the Stanford Digital Library project that provides a degree of flexibility to the users while requiring no changes in the existing information services that are offered. The Stanford Digital Library project focuses on interoperability of networked information sources, library literature, and Web resources (Stanford University Digital Libraries Project, n.d.). The project is part of the Digital Library Initiative discussed below.

A similar example of experimenting with innovative research tools on the World Wide Web is reported by Schatz et al. (1996). These authors develop a large-scale testbed of scientific literature that can be made available through the Web to large numbers of users. These authors note that users are less than fully satisfied with their results when presented with huge bodies of semi-structured materials. As a consequence, they are experimenting with methods to simplify access to distributed repositories using generic search protocols.

Such new methods for information retrieval underscore the need to identify alternative ways to index and integrate large bodies of information from diverse subject disciplines. Much more research needs to be performed to discover new information retrieval methods and storage techniques. Such developments in search and retrieval mechanisms may lessen the confusion of users when presented with large quantities of information from diverse subject disciplines.

Allen and Scott Morton (1994) look for innovative ways for coping with this period of rapid change. Their chapter on the study of user needs in corporate environments helps to fit in the client or user with the development of information technology. With the

electronic library, basic methods for seeking and accessing information must change to enable access to new sources of information such as multimedia, digital collections, and the Internet.

A special report on the Internet in the March 1997 *Scientific American* outlines several issues associated with the developing Internet (The Internet, 1997). Lynch (1997b) considers the future of the Internet that he sees as not a digital library but a completely new communications tool. Giving up any hope of organizing the Internet, Hearst (1997) suggests that new user interfaces must be developed to provide users with a better means of searching this new information resource. Resnick (1997) reviews various methods of filtering Internet content in order to make the tool safer and more interesting. Lesk (1997) discusses the various methods of converting print materials into the future electronic library and highlights the problems and expense of the task. Kahle (1997) describes a new method of archiving the tremendous and constantly evolving resources of the Internet.

The Internet in particular opens up many educational opportunities for students. The Internet, World Wide Web, multimedia communications, and worldwide electronic mail are used in libraries in new and creative ways. A recent issue of *IEEE Computer* explores several projects that are in development as part of the Digital Library Initiative (see, e.g., Schatz & Chen, 1996; Wactlar, Kanade, Smith, & Stevens, 1996; Smith, 1996). The projects are supported by the National Science Foundation, Advanced Research Projects Agency, and the National Aeronautics and Space Administration. Digital library projects are currently underway at Carnegie Mellon University, Stanford University, the University of California at Berkeley, the University of California at Santa Barbara, the

University of Illinois at Urbana-Champaign, and the University of Michigan. Through the Digital Library Initiative, researchers are seeking new ways to gather, store, and organize digital information as well as new ways to search, access, and display the information. The source data at the project sites include scientific literature, geographic information, and video files. These projects provide a small glimpse of the major changes that are possible for libraries in the next few years. Library patrons now access these new technologies, yet may not always associate their use with traditional library service (see Raitt, 1994). Finding the link and common ground between the rapidly emerging technologies and traditional library service is important to the future of libraries.

Role of the Librarian

The role of the librarian in education is a matter for discussion. Beyond collection development and organization of information, a major and well-accepted role for the librarian is in training users in library research tools and techniques. Many new tools supporting full-text retrieval such as powerful Internet search engines are becoming available directly to users. As List (1995) suggests, librarians must track the exploding information scene in order to guide users.

Anderson (1995) surveys users of new research tools. Anderson notes librarians must discover those tools users are actually accessing. This can then determine where the training energies of librarians should be spent. According to Anderson, users seldom use more advanced techniques such as combined search methods using data from multiple

fields or searches requiring Boolean operators. They rely instead on simple keyword searches to locate information. The author suggests that librarians should be prepared for this type of simple user access and encourage information vendors to gear their products to basic user needs.

The role of the librarian in the future of scholarship is explored by several leading scholars including those at a 1995 symposium (St. Clair, 1995). Several roles of librarians are identified including subject expert, organizer, quality filter, and teacher. It is further pointed out that these roles change as librarians turn to new technologies to collect, locate, gather, and deliver information.

Other authors also explore the changing role of the librarian. For example, Buckland (1992) puts librarians in the role of access providers for all types of information and suggests that library services must be redesigned to adapt to technology. Hunt (1995) emphasizes the interpretive role of the librarian. This role involves taking a more active position in the information environment by adding service functions including source evaluation, source selection and presentation, and training in order to help shape the context of information retrieval. Hunt sees the librarians' role moving beyond mere organization of information and direction of patrons into providing a more complex range of services such as the interpretation of information for users.

Garrison (1994) regards integration of networked information into traditional print and multimedia sources as an emerging function for librarians and suggests that librarians take the initiative in exploiting electronic sources of information for themselves and their users. This author suggests that because there is a change occurring in the way that knowledge is created a new role for future librarians is required. Library staff need to be

prepared to provide technical support to users. As patrons become more familiar with personal computers, they expect librarians to be familiar with new ways to access scholarly information. Staff requires expertise in "user interface design, the development of networked information systems, and the handling of electronically published information" (p. 235).

As mentioned previously, Snyder and Starratt (1995) propose an even more powerful role for the librarian in the distance education environment. These authors position the library and the librarian at the heart of the infrastructure to support distance learning.

Authors such as Young, Dowlin and Shapiro, and Nagle agree that the librarian has an important role in introducing new technologies to the user. Young (1996) sees major changes on the horizon including the need to develop a new paradigm for librarianship so that librarians can accommodate the technological changes that are occurring. Dowlin and Shapiro (1996) also suggest that the librarian needs to shift into the role of facilitator and find new ways to measure success. Nagle (1996) is much more specific suggesting that the librarian must provide quality literature to the patrons as well as serve in an educational role.

Brophy (1995) looks at the importance of using information technology to provide better service to off-campus students. According to Brophy, due to the demographics of the students in distance education programs, librarians have contact with a group of students who vary in age and work experience. Therefore, the instructional impact of the librarians can be even greater in the distance environment than with other groups of students. Charkes (1995) also writes that libraries must be concerned with the technology used to communicate content to the user and suggests a completely new role for librarians

as managers of emerging technologies. Managing information technology must be a skill developed by librarians in order to meet the current and future needs of patrons seeking information from a broad variety of sources in multiple formats. This is a new role for the librarian that is strengthening as emerging technologies are integrated into the library infrastructure.

Hunt (1995) predicts a new role for librarians that must emerge with the advent of the conversion of more materials into digital formats. This role includes aspects of evaluation of information and putting information into context for users in order to help them interpret meaning. Technology makes so much information available that this type of mediation becomes necessary.

Piggott (1995) also covers the impact of evolving technologies on librarians and library service. She identifies the information superhighway, network management, user friendliness, and the mobile workforce as important elements causing this impact. The information superhighway is providing the interoperability to allow ubiquitous access to information. According to Piggott, librarians must develop expertise in network management in order to ensure the proper delivery of information or library services. Librarians can also work toward improving user friendliness of information systems in order to assist the users. And finally, the librarian will be expected to gather information that, in the future, will be readily available to the increasingly mobile workforce. Her solution to all of these development is a reengineering of traditional library service. She describes her own efforts to establish a virtual library at the Bank of Montreal and sees librarians taking an important role in the delivery of all types of information to future users.

The librarians providing library service to distance education populations cannot obtain an immediate reaction and feedback from their clientele. Because of the lack of direct contact with patrons, librarians are put into the role of interpreters. In other words, the librarian must interpret the needs of the user based upon limited contact. Newsome and Rosen (1995) look at the role of the librarian and also measure the degree of professional isolation that exists among librarians serving a distant population. Professional isolation is a new concern for librarians and influences the way services are provided.

Some authors caution that librarians are losing their pivotal role in facilitating information delivery. As early as 1988, Perry warned that the evolution of electronic publishing might mean that librarians would lose some of their customers as the role of intermediary would become less necessary. More recently, Schement (1996) acknowledges that librarians have fallen on the outside of society's information culture and warns librarians to take the necessary steps to modify this development. He suggests several ways for librarians to recover their central role in providing and interpreting information for the community. These include teaching information-seeking skills to help people manage the explosion of information, delivering library services to the locations where people are accessing information such as in their homes and offices, and building networks of information resources through the use of communications technologies.

Other authors still assign librarians a key position in the information society. For example, Morville (1996) proposes that the organizational skills of librarians are going to prove useful in creating order out of the chaos that is developing on the Web. Vander

Meer (1996) also suggests that librarians have a responsibility to learn about the Web in order to instruct students and faculty in its use.

Each of these unique, traditional and developing roles of the librarian, as access provider, organizer, subject expert, quality and content filter, teacher, or guide, is changing with the growing use of emerging technologies for collecting, locating, gathering, and delivering information in a variety of formats.

Surveys and Survey Development

The survey is a common tool to assess the needs of the library patron and quantify the value of library services. Emery (1993) compares the study of library user needs to consumer research. He concludes that because of this similarity, many of the findings of consumer survey research can be easily applied to the library setting. General information on preparing surveys and improving survey questions is available in the series from Sage Publications entitled *Applied Social Research Methods*. Particularly the two books by Fowler, *Survey Research Methods* (1984) and *Improving Survey Questions* (1995), are sources used in creating surveys for this study.

Electronic surveys are a relatively recent development in survey research. The most extensive work on electronic surveys so far is conducted by Berge and Collins (1996). Based upon their own use of electronic surveys in their research, Berge and Collins discuss the advantages and limitations of electronic surveys. Among the advantages they list are ease of completion for the individual surveyed, rapid response time, and low cost of electronic surveys. With electronic mail, it is also possible to send an electronic survey

to a larger pool without using complicated sampling methods to select a small group of recipients. These authors point out some of the limitations of electronic surveys including the technical expertise required to participate in the survey and the lack of anonymity of the respondents due to the tagging of addresses in electronic mail. In an interesting coincidence, Berge and Collins (1995) are also involved in research on distance education. They regard technology as a key in enabling the future of distance education and include such tools as computer bulletin boards, computer conferences, and electronic guest lecturing in their exploration of computer mediated communication in the classroom.

Surveys are used in many different types of libraries. Cundari and Stutz (1995) report on a survey in a special library conducted in conjunction with a Total Quality Management (TQM) process. They use the results of the survey to develop strategies for improving library services that focus on increasing user awareness of existing services and materials. In this case, increased visibility is the key to improving quality for the library. Calvert and Hernon (1997) report on a continuing work to develop a survey to measure service quality in academic libraries. They attempt to identify and classify the underlying dimensions of service quality in order to assist others in attaining this goal. The complete survey instruments are found in the text by Hernon and Altman (1996).

Another service quality survey in the special library environment is reported by White and Abels (1995). They adapted for use in a library the SERVQUAL and SERVPERF instruments developed in 1988 for measuring service quality. Stalker and Murfin (1996) report on the use of the Wisconsin-Ohio Reference Evaluation Program (WOREP) to evaluate the reference services at Brandeis University. They conclude that

high-quality reference service is dependent upon a commitment from the library administration to high-quality library service.

Busha and Harter (1980) provide instruction on writing and evaluating library surveys as well as reporting on examples of a broad variety of survey research in academic, public, and school libraries. These examples illustrate the various survey techniques and questions that are used to gather the appropriate information from a patron population.

A good source for sample surveys is the CLIP Note from the Association of College and Research Libraries published in 1995 (Adams & Beck, 1995). This source includes more than 20 sample surveys varying from those of a general nature on overall library quality to detailed surveys on specific online sources and individual library services. Unfortunately, many of these surveys are based upon specific library programs and services and fail to explore the more general information needs of patrons or identify where patrons actually find their source materials. Another example of survey use for improving library services is described by Meldrem, Johnson and Ury (1995). As described above, they detail efforts at one small library to implement changes based upon input from users. All survey questions are in response to library-developed programs from the view of the librarians. No effort is made to reach beyond the information provided by and available through the library. Meldrem, Johnson, and Ury (1995) stress the importance of using surveys to hear the voice of the customer in library planning.

Slade (1995) issues a call for research on library services for distance students. According to Slade, use of new technologies, satisfaction of students and faculty, and quality of service are among the areas that need more data. This data can help to

determine the information needs of distance students and assist librarians in discovering new ways to improve library service.

Many useful surveys employed in a variety of distance learning situations are described in the proceedings of the seven Off-Campus Library Services Conferences sponsored by Central Michigan University Libraries and the CMU Extended Degree Programs. For example, Gover, Pappas and Wykoff (1995) report on a survey of branch campus library use by library patrons. Their analysis of the survey responses is extremely detailed and can be helpful for planning future services. They also make some interesting points regarding library use, library instruction, and the impact of technology on library access. For example, the low level of library use in this case is based on a misunderstanding of the nature of the resources available through the library. Further, there is no integrated plan in place for library instruction. The survey also reveals that only a relatively small group of users have the capacity and skills to access the library through electronic means.

In another paper from the same conference, Kabel, Moulden and Fritts (1995) use a survey to assess faculty attitudes regarding library services to off-campus students. They use this survey to determine the future direction of library services at their institution. They ask about specific services offered by the library in order to assess the impact these services have on distance programs. Lebowitz (1993) and Ruddy (1993) report on similar faculty attitude surveys. Craig and DuFord (1995) also study the attitudes of the faculty. Results indicate that faculty perceptions of libraries, librarians, and library service are based upon their own personal experiences during their education and academic careers. When faculty are satisfied with library services that they have used in the past, they will

reflect that level of satisfaction to their students. They suggest a direct connection between assignments given by the faculty and library use by the students.

The surveys conducted by Peterman and Schultis (1995) include the faculty but also extend to administrators, librarians, and program directors. Their results indicate a discrepancy in the satisfaction levels of students, librarians, and administration regarding the same collections and services. This finding underscores the need to gather input from all groups when attempting to evaluate services.

Quality Function Deployment

Quality Function Deployment (QFD) has its roots in the Japanese quality movement (see Eureka & Ryan, 1995). It was brought to the United States initially by the automobile industry. The primary use of the QFD methodology is in manufacturing, but there are also various examples of its success in the service industry. The first major U.S. exposure to QFD is by Hauser and Clausing in their 1988 article in *Harvard Business Review*. They provide simple descriptions with easy graphics on building the "house of quality" that is the central theme of QFD. A clear definition of QFD is provided by Quinlan and Byrne (1995) in their chapter in the Eureka and Ryan text (1995):

> QFD is a disciplined planning method that focuses on understanding what the customer wants and needs and then translating these customer requirements throughout product development and manufacturing to make sure the resulting product meets or exceeds customer expectations. (p. 100)

Authors describing QFD in the manufacturing and business environments through the use of examples and case studies include Rao (1996), Guinta (1993), and Daetz,

Barnard and Norman (1995). An implementation of QFD in a university setting is described by Ermer (1995). In his research, Ermer uses the QFD methodology to report the results of information gathered from students, faculty, and local industry representatives. This information is used to improve the curriculum of an academic department. Ermer finds that QFD is an acceptable method of reporting such a comparison.

In the current inquiry, the QFD methodology is used to compare the survey responses of students, faculty and administration and to prioritize the areas of library service that need improvement based upon the results of the surveys in this study. The graphical "house of quality" representations provide a vehicle to communicate the results of the research.

Pitman, Motwani, Kumar, and Cheng (1995) describe another implementation of the QFD methodology in an educational setting. They use QFD to evaluate an MBA program and direct appropriate resources toward improving the program to match the desires of the students and the business community.

Model Building

Model building is important in several research areas including communication theory (Casstevens, 1979), management (Rieger & Wong-Rieger, 1988), decision support (Binbasioglu, 1994), and library science (Steffan & Marshall, 1993). In all of these disciplines, the creation of a model entails mapping out existing services and planning new services for the future. Models provide an opportunity to see things in a new way

that is key to implementing new technologies. For example, Adibi and Trolley (1995) present a model of an electronic library project for the electronic distribution of scientific journals. They test different schemes and try out various economic patterns in order to see electronic distribution in new ways.

An older but useful explanation of model building is provided by Casstevens (1979). The author's explanation of model building in the context of communication theory is simple and elegant, describing what a model is and what it is used for. The important point is made that models are designed to suit the needs of an organization in a particular situation. Models are based on reality, but they are simplified versions of reality that can be used as analytical tools.

A more recent, but still dated, example of model building is provided by Rieger and Wong-Rieger (1988). These authors stress the importance of building a model that is based on reality. They also introduce the concept of building temporary models to assist in the data collection process. These models are later changed or expanded based upon the data. Another method of reusing existing models based upon past experience is described by Binbasioglu (1994) in his mathematical and technical look at model building. Lucas (1996) takes a progressive look at what information technology can do to completely transform an organization. This author uses technology as the basis for innovative organization design and models the organization based upon its implementation of technology.

Building models of library service is common. Buckland's brief treatise (1992) is an excellent reflection on the changes that may be necessary in library service in order to accommodate the electronic library. He outlines some of the changes that will be

inevitable in building new models for the electronic library. These changes include a redefinition of the library catalog into an interlinked format so that the catalog and the library collection is seen as one unit. Further, Buckland states that libraries must provide access to all types of information, including electronic documents. Buckland also predicts a switch from librarian-provided service to self-service in libraries so that user-centered access to information will be expected.

Steffan and Marshall (1993) describe the "Schaffner Model" of library service at an extension campus of Northwestern University. The authors bring together all of the elements of quality service in their planning checklist. Among the important elements included in their model are instruction, information technology, document delivery, collaboration, cooperation, and financial investment.

Mann (1993) attempts to blend traditional library systems and services into newer, more innovative computer applications to provide several alternative models for envisioning information provision. He provides a new perspective on many traditional information resources in order to find innovative uses for them. For example, he presents the "computer workstation model" as a new way of searching all information sources at the same time rather than requiring background knowledge in order to use the various sources of information. He also proposes new ways of looking at information as solutions to organizational problems.

Covi and Kling (1996) compare the perspectives of faculty, librarians, and information technology personnel regarding the use of digital libraries in a very good example of abstract modeling of new services. They study what constitutes effective use of digital libraries. Their most interesting contribution is the development of several

different models that can be compared to each other. This outcome serves as a good tool for constructing abstract models. The conflicting views of faculty and librarians regarding digital libraries are highlighted as well.

Modeling of current and future library services is becoming even more important as newer technologies are introduced into traditional library settings. Smith (1996) describes the development of a digital library project for processing map information for real-time retrieval. This project will make accessible materials that were once only available in large research libraries. Through the implementation of user interfaces and catalogs specifically designed for the retrieval of geographical information, users can access maps and data sets that meet their specific information needs. Smith relates the structure of what is being done with digital information in this project to traditional library models in order to develop new models for incorporating emerging technologies into the traditional delivery of information. By using familiar components of a traditional library system, the author translates difficult data storage concepts into a model that is easy to understand.

The growing popularity of the Web is forcing more librarians to develop new models to introduce this technology into the more traditional environments. Vander Meer (1996) suggests that academic librarians have a responsibility to learn about the Web and in turn instruct the rest of the campus in its use. She provides a new model of library service incorporating Web technology. In this model, the librarian serves as a scout for locating information on the Web, promoting awareness of the Web, and evaluating appropriate Web sites. By embracing this new service model, librarians become essential mediators in providing campus access to the Internet, as well as building an awareness of the

importance of the Internet in facilitating access to information in the academic environment.

Von Wahlde and Schiller (1993) discuss specific ways in which libraries can adapt and develop into the new virtual library. They point out that libraries have an important position in providing the systems and services to support the evolving virtual library. Libraries can also become more proactive in disseminating or generating the electronic information that can be the basis of the virtual libraries. To illustrate these evolving methods, Von Wahlde and Schiller present a new model for the virtual library that provides the basic elements of library management and describe how each element changes in response to the transformation arising from the creation of a networked information environment.

Modeling techniques are used by Lebowitz (1995) in formulating steps that must be taken in developing off-campus library services. These steps include needs assessment, program design, program implementation, and program evaluation. The author takes a very systematic approach to building the model. Lessin (1991) provides examples of several different models of extended library service that illustrate that there is more than one way to meet the needs of the students. The author also notes that new models are possible with the rapid growth of technology.

Slade (1991) provides new models of library support based on traditional areas of support in his overview of library support for distance education programs in Canada. By outlining common issues and concerns among diverse programs such as geographically spread out institutions and part-time colleges and universities, he develops important questions and outlines new ways of delivering library service. Slade recommends a

closer working relationship between library staff and administrators of distan programs and inclusion of librarians in program planning and course development. author also suggests that librarians must adapt new technologies to meet the needs of distance students.

Pettingill (1995) reviews the library program plan at Old Dominion University in an outstanding example of modeling library services to provide additional support to meet the particular needs of distance students. According to Pettingill, communication is the key tool to successful model implementation. She also states that two important elements of the program development process are review and evaluation. Student satisfaction surveys conducted in a formal way are at the heart of the evaluation efforts for academic libraries.

Mann (1993) also describes the importance of modeling new library services to correspond to the actual needs of the user population. Through his "Principle of Least Effort" (p. 91), he stresses that library models should be based on those sources of information that users actually need and utilize on a regular basis. In all cases, those sources will end up to be the ones that are easiest for the users to manipulate. According to Mann, any models that attempt to include information tools and sources beyond these basic resources are a wasted effort.

And finally, Lange and Farr (1993) review the library planning process at the University of Wyoming and point out that interactivity is required between librarians and administrators in order to develop excellent programs. They stress that human connections can be as important as technical connections in planning and delivering quality library services for distance education students.

Summary

Distance education and libraries are both fields that benefit from recent advances in technology. The electronic library has the potential to bring information resources to a much wider audience if librarians identify the appropriate roles to play for their user populations. In the evolving academic environment, these user groups include both on-campus and distance students. Through user surveys and the implementation of QFD techniques and model building, new ways to serve all library users can be enhanced. While the research in all of these areas is robust, the current study combines them to identify innovative ways to harness emerging technologies in the library to accommodate the requirements of the distant learner.

Chapter III

Methodology

Research Methods Employed

The goal of this study is to evaluate the research and information needs of students enrolled in several distance education programs at Nova Southeastern University in order to develop a new model of library service. The evaluation is accomplished through the use and analysis of several survey instruments developed during the course of this research. Students are surveyed to assess their own opinions regarding their information seeking behavior and to gather their opinions on the quality of services provided by NSU's Einstein Library. The faculty and administration are also surveyed regarding their satisfaction with the library services currently provided.

Part of the analysis of the results utilizes a variation of the Quality Function Deployment (QFD) methodology (Guinta & Praizler, 1993). The reasons for the variation are explained below. This analysis assists in formulating the model for library services in the distance education environment that is proposed.

Besides the ideas drawn from the literature, additional sources of information used to construct the model include interviews with the librarians at the Einstein Library and a

review of the promotional materials prepared by the librarians and distributed to students. These sources provide a view of the current level of services provided by the Einstein Library and help in envisioning the model of future services.

Specific Procedures Employed

Selection of the Study Population

It is first necessary to determine the appropriate user population for this study. The graduate student population at Nova Southeastern University totals more than 10,000 (E.A. McDaniel, personal correspondence, July 26, 1996). With the help of Dr. Elizabeth McDaniel (personal correspondence, July 1996), Executive Provost, Vice President for Academic Affairs of Nova Southeastern University, the researcher determined that the most appropriate user population is the graduate students in the School of Computer and Information Sciences (SCIS), the Center for Psychological Studies (CPS), and the School of Social and Systemic Studies (SSSS), the Fischler Center for the Advancement of Education (FCAE), and the School of Business and Entrepreneurship (SBE). The use of an electronic questionnaire facilitates the survey of such a large population.

These groups are selected based on the diversity of their bodies of literature and their availability. Students in the School of Computer and Information Sciences are well trained in accessing computerized information sources due to the subject area they are studying. They operate in a fast-paced and quickly changing area of study. The information resources required in their research are recent periodical articles and recently published books. The courses in this program focus on many aspects of emerging

technology such as multimedia, virtual reality, and networking for which research must rely on alternative sources of information that are available in an electronic format rather than in printed books and journals.

Students in the Fischler Center for the Advancement of Education are working in an area with a long literature history. Information research resources are available in print books and journals. This is, however, another fast growing research area and there are many online sources of information available.

Students in the School of Business and Entrepreneurship also rely on current sources of information. Their research is sometimes based on case studies from current literature. This is another area where the published book materials often lag behind the periodical or magazine sources.

Students in the Center for Psychological Studies participated in the study at the suggestion of Johanna Tunon, Distance Services Librarian at the Einstein Library (J. Tunon, personal interview, March 4, 1996). She suggested that the Einstein Library is often successful in reaching this group of students with its services. These students are receptive to training and heavy users of the Distance Library Services Department. The Dean of this group also serves as the head of the School of Social and Systemic Studies (R. Chenail, personal correspondence, February 3, 1997). Because the Dean was willing to participate in this study, both groups are included.

Approval was sought from Dean Edward Lieblein of the School of Computer and Information Sciences (SCIS) to survey outside SCIS. This approval was obtained on October 19, 1996 (E. Lieblein, personal correspondence, October 19, 1996). Approval was the fundamental step. It was also necessary to obtain the help of others within the

University in order to carry out this large survey. With the help and suggestions of Dean Lieblein (E. Lieblein, personal correspondence, February 3, 1997), the appropriate contact persons in the other schools were located. Approval was requested from the Deans and Directors of the other Schools in February, 1997. They all granted permission to include their students in the survey population.

The Survey Process

Based upon an analysis of surveys reviewed in the literature, two new surveys were developed by this researcher (see Appendix A and B). These surveys were distributed to the selected population through electronic mail. The technology used for the survey was another important consideration. The decision to conduct a survey in an all electronic format was not an easy one.

There are many factors involved in using electronic methods for communicating with a survey population. With a survey that is distributed electronically, there can be a significant group of the population that is left out because they may lack the access to the level of technology or skill required to complete the survey instrument. The survey results can be influenced by the technological sophistication level of the participants. In a distance education environment, the technical skill of the survey group is less of a problem. It was assumed that all of the students in the off-campus programs are familiar with electronic communications and should feel comfortable communicating electronically.

Although some consideration was given to using the newer, more sophisticated capabilities provided through the Web, it was decided that the greatest common

denominator among the students would be electronic mail. Electronic mail can elicit the largest response and does not limit people who do not understand the technology or do not feel comfortable using it. Brief instructions were provided with the survey explaining how to complete and return it.

Given that the survey population selected in this study is a computer literate student group that should not have concerns regarding their anonymity, limitations caused by the lack of anonymity of electronic mail were not considered to be an obstacle. Further, respondents were advised that the surveys could be returned by U.S. mail as another option for concealing their identities. The advantages of using electronic mail include the ability to use the entire population rather than a random sample, speed, and ease of completion.

Once the decision was made to conduct a survey electronically, some of the logistical questions were removed. It was still necessary to work within the hierarchy of the University to obtain access to the electronic mailboxes of the survey population. Frank Mitropoulos, Director of Computing for SCIS, provided the technical assistance in acquiring the electronic mail addresses and sending the survey through electronic mail (F. Mitropoulos, personal correspondence, February 1997). The user population was the entire mailing list of email addresses for students in the selected programs. An exact count was not obtained as the email program for survey distribution was conducted automatically through the use of an electronic file.

After identifying the composition of the user population for this study, selecting the appropriate programs and departments to survey, and determining to utilize the format of the electronic survey, two survey instruments were developed and administered through

electronic mail to graduate students in the selected graduate programs at Nova Southeastern University (see Appendix A and B). The instruments were developed to determine which of the library services provided directly by the Einstein Library were important to the students. The instruments also identified other library services and sources of information the students may actually use to complete their required course work in addition to the sources provided directly by the Einstein Library. These include other libraries on the NSU campus, electronic access or personal visits to other libraries including local libraries and libraries at work, personal collections, friends, and use of the Internet and Web.

Through this identification and indication of information sources actually used by the students, the actual and perceived needs of the students were delineated. Based upon the survey choices, respondents had the option of identifying existing library services such as:

--NSU online catalog

--use and effectiveness of remote online catalogs

--methods of bibliographic instruction

--benefits and limitations of online guides

--provision of physical access to the local collection

--use of electronic mail and telephone communications

--interlibrary loan

--effectiveness of reference assistance.

Similar studies detailed in the literature were used to create this initial list of services (see Corrigan, 1995; Gover, Pappas & Wykoff, 1995; Slade, 1991). The survey instruments

were also reviewed by a panel of three experts in the field of library and information science[3] and revised based upon the suggestions of the experts.

For the user groups at each school, two different styles of the survey instrument were developed. Each style of instrument was administered to approximately one-half of the population of each school. One style (referred to as the library survey, see Appendix A) stressed the fact that the library was conducting the study in order to improve service. The other style (referred to as the information survey, see Appendix B) did not mention the library, but included broad questions about the information needs of the students. The survey population was randomly divided into two groups and each group was sent one style of survey. It was believed that there would be a significant difference in the responses to the surveys and in the sources of information listed by the students based upon their understanding of the basis for the survey.

As previously mentioned, librarians at the Einstein Library were consulted when selecting the study population. During initial interviews in March 1996, the librarians revealed that some distance education programs such as those of the School of Computer and Information Sciences did not take full advantage of services offered by the library. On the other hand, the librarians stated that students in the School of Psychology were active library users (R. Bogorff, personal interview, March 4, 1996; J. Tunon, personal interview, March 4, 1996). The assumption was made that using the same surveys for such diverse user groups in the various academic programs would highlight some of the differences in attitude or approach among students and the faculty. This would help to

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3 Dennis Carrigan, Assistant Director, School of Library and Information Science, University of Kentucky.
Martha J. McDonald, Executive Director, Greater Cincinnati Library Consortium.
Donald E. Riggs, Vice President for Information Services & University Librarian, Nova Southeastern University.

reveal why librarians felt there was such a difference in the use of their services between the various programs.

As also previously indicated, in the survey students were asked to comment on services provided by the Einstein Library and any other sources of information used. These comments provide a broader perspective on the types of information needed by the distance education student. The selection of traditional and electronic resources available range from the Internet and on-site collections in local and regional libraries to electronic resources provided by commercial information providers. In addition, there are new methods to locate and access information developed by many companies in the information industry. For example, the Institute for Scientific Information (ISI) is creating a new electronic library that provides universal access to scientific information while also providing the important economic incentives for the publishers and the authors (Trolley, 1995). The Uncover Express service from the Colorado Alliance of Research® Libraries (CARL) provides access to contents information on thousands of journals as well as nearly instantaneous delivery of full-text articles from journals in a wide variety of subject areas (Online documentation from CARL service, available by telnet to database.carl.org).

When developing a model for new library service, such alternative sources of information should be integrated with the more traditional resources in order to provide students with a consistent and uniform view of all the available resources. In this inquiry, it was hoped that additional alternative full-text sources of information that are used by NSU students would be identified. The survey of the students included questions that allowed students to comment on their use of any alternative resources.

Finally, expectations of the faculty and administration influence each student's use of the local library resources and their view of the world of available information. For this reason, the faculty of the selected programs and the administration were also asked to rate the importance of various library services provided through the use of current emerging technologies.

A survey instrument was developed specifically for the faculty and administration that gauges their attitude toward libraries in general and specifically their opinion of the services provided by the Einstein Library (see Appendix C). This survey was conducted shortly after the survey of the students so that one set of results had no influence upon the other. The survey included questions regarding faculty attendance at library instruction sessions, faculty use of library services, and the importance of library support to the students for the completion of assignments.

Quality Function Deployment

QFD (Quality Function Deployment), a methodology that recently became more popular in manufacturing and management, was adapted for the analysis of the survey results in this study. The QFD methodology enhanced survey instrument development and assessment. In the QFD methodology, the input of users or customers is gathered and analyzed so that this input can have a direct impact on improving the quality of a product or service. The input is referred to as the "voice of the customer." The results of QFD methods are formulated and reported in a matrix, most often referred to as the "house of quality," that allows the results to be studied and compared in a quantifiable manner (Rao, et al. 1996).

The QFD approach fits in well with this study. It is a proactive methodology. It is not meant to solve problems, but to improve existing systems to match and beat the expectations of the user. Zairi and Youssef (1995) discuss using QFD to identify user requirements and determine what the user wants from a product or service. The QFD methodology is a way to translate the voice of the customer into the services provided by the organization. This study is not meant to solve problems, but to find innovative approaches to meeting the evolving needs of the library patron in the new age of technology. A simple QFD matrix is developed to illustrate the potential applications of this methodology.

Service Satisfaction Survey

In order to position the results of this research in accordance with developing user needs, a second survey instrument was created and administered to a segment of the entire survey population (see Appendix E). This service satisfaction survey was performed approximately three weeks after the initial usage study. This process was also based on the QFD methodology. Services were first identified by the users, then quantified by the users. The second survey revealed to the participants that the subject of this research was the library services provided by the Einstein Library. The user satisfaction survey was general in nature, covering all aspects of library service. The survey also included questions regarding the implementations of current and emerging technologies that were the focal point of the initial survey. It also incorporated some of the services and products identified by students in the initial survey. The important areas to emphasize for creating a model of the effective use of emerging technologies in library

services for distance learning students were identified by comparing the results from these two data collection instruments.

A New Model for Library Service

After identifying the various sources of information used by the students, analyzing the existing library system and services, and surveying the library users, alternative approaches for accommodating the information needs of distant learners were explored. One approach involves building new models based upon traditional strategies as developed by Mann (1993). He determined that old library models should not be abandoned in place of new technologies, but the old and the new should be used together to create contemporary patterns. Based upon Mann's work, the existing systems successfully meeting the needs of the students were supplemented by suggestions for new approaches to develop a consistent model.

The vision of the librarian has an influence on the type and level of service provided by any library. The view of the librarians at the Einstein Library and their own valuation of the services provided were studied through interviews and examination of the materials prepared by the librarians for use by the distance students. For example, materials provided through the Electronic Library on the NSU online network present a particular perspective of the library to the distance student. The library also produces a videotape and a packet of promotional materials to market their service. These materials provide a particular perspective of the current presentation of library services to students as well.

Distance education has become very popular. While Nova Southeastern University was a pioneer in this type of education, many other schools are learning the economic

benefits of this new approach to education. In a guide to distance graduate schools published in 1994, more than 150 schools are listed including such traditional campus-based institutions as Syracuse University, the University of Massachusetts, and the Rochester Institute of Technology (Duffy, 1994).

There are many distance education programs, such as those at Indiana University, Old Dominion University, or Central Michigan University, similar to the program at NSU in that they are also campus-based and depend on the traditional services and facilities available from a university. There are other distance education programs that are not campus-based and attempt to educate and service students without the resources traditionally available through a major university. An example of a non-campus program is the Union Institute that is based in Cincinnati but maintains no traditional campus facilities (see Duffy, 1994, p. 204-205). Research into the various approaches to providing library service at both campus-based and non-campus institutions provide a framework for evaluating alternative approaches in developing the model of library services described in this study.

Based upon the results of the needs assessment and survey of information sources used by the students, the user satisfaction survey, the survey of faculty and administration, and the study of other similar institutions, a model for Distance Library Services at the Einstein Library of Nova Southeastern University is proposed. This model describes procedures for providing library instructional resources online for access by distance education students. This new model defines new roles for the librarian in the academic environment. Innovative methods of evaluating and measuring library service are also delineated as an outcome of this research.

Formats for Presenting Results

Results of the surveys are presented as raw data (see Appendices D and F) and also analyzed in Chapter Four in the context of the development of the library model. The QFD methodology results in the creation of a "house of quality" matrix that serves as a graphic representation of the areas in which the library can improve its services to the students.

Based upon the results of the surveys and the analysis of the results, the model for library services is detailed in narrative and graphics. As stressed in the modeling literature, the model developed in this investigation is general in nature, yet grounded in reality and able to be adapted by any library in developing new products and services (Rieger & Wong-Rieger, 1988; Steffan & Marshall, 1993).

Milestones

The Preliminary Dissertation Proposal for this research was accepted in the fall of 1996. The target user population was also selected in the fall of 1996 and expanded in the winter of 1996/97. The preparation of survey instruments took place after the acceptance of the Preliminary Dissertation Proposal and was completed in February, 1997. The surveys of students, faculty, and administration took place in March, 1997 and the results were subsequently analyzed during the Spring of 1997. A brief review of the library materials and resources provided by the Einstein Library and available to the students took place following the tabulation of the survey results. The satisfaction survey

of the students, faculty, and administration was administered in the spring of 1997, approximately three weeks after the initial survey, followed by the analysis of the results. Interviews and electronic mail correspondence with librarians at the Einstein Library were conducted throughout the course of this research. The review of other programs and emerging technologies for use in delivering library services was also ongoing. Development of the new model for library service was started in the late spring of 1997 and completed with preparation of this report.

Resource Requirements

Two librarians of the Einstein Library at Nova Southeastern University were interviewed regarding current services provided to the distance education programs. Based upon interviews with Robert Bogorff, former Director of the Library (R. Bogorff, personal interview, March 4, 1996), and Johanna Tunon, Head of Distance Library Services (J. Tunon, personal interview, March 4, 1996), along with the reports from Nova Southeastern University and Peter Spyers-Duran cited above, the University and the Einstein Library were anxious to identify and meet the needs of the distance education segment of the university population.

Nova Southeastern University is an excellent model for this study due to the institution's long history in delivering education through distance programs as well as its innovative uses of technology to educate students. The administration in the selected schools indicated their willingness to participate in this study. While the entire selected study population was important for their varying perspectives, the student body of the

School of Computer and Information Sciences served as a most valuable study group due to their increased awareness and appreciation for emerging technologies. It was expected that this group would be ahead of the rest of the student population in their use of technology to locate information. They proved to be aware of a wide variety of information resources and most were fully conversant in the appropriate paths to information to meet their needs.

Reliability and Validity

As stated before, this study cannot be generalized beyond the distance education students in the selected schools at Nova Southeastern University. It is a valid indicator of future directions to be taken at the Einstein Library and serves as a model for library services in other similar situations. The study reveals patterns of information-seeking behavior that may be expanded to other populations. Because all libraries and academic institutions have a different history, culture, and organization, similar surveys should be conducted in institutions before implementing the model developed in the current study.

Summary

Quality, overall student satisfaction, and accreditation depend on the successful provision of library services to all students, including those studying from a distance. In order to provide quality library services, it is first necessary to evaluate the needs of the clientele. This study develops a method of evaluating and reporting the information

needs of a portion of the distance learning graduate student population served by the Einstein Library at NSU. Further, a model of quality library service based upon the implementation of emerging technologies is proposed. Libraries and the broad access they provide to information and instructional resources are getting lost in the maze of online information available to students and faculty. Libraries must recover their position at the heart of educational institutions and by doing so maintain their purpose and standing within the wider academic community. The results of this study provide direction for the future development of library services at Nova Southeastern University, and are also applicable in other distance education environments.

Chapter IV

Results

Initial Survey Process

The initial survey was distributed through electronic mail to the graduate students in the School of Computer and Information Sciences, the School of Business and Entrepreneurship, the Fischler Center for the Advancement of Education, the Center for Psychological Studies, and the School of Social and Systemic Studies. A total of 7,008 survey instruments were sent through electronic mail on Friday, March 28, 1997 using an automated electronic mail distribution program.

There were 509 responses (approximately 14.5 %) to survey instrument A (see Appendix A), that mentions the survey is being conducted for the use of the Einstein Library. The majority of the responses, 494, were received through electronic mail. There were 15 responses received through U.S. mail.

There were 497 responses (approximately 14.2 %) to survey instrument B (see Appendix B), that does not mention the Einstein Library but contains questions about information needs. The majority of the responses, 480, were received through electronic mail. There were 17 responses received through U.S. mail.

A number of error messages were generated in response to the electronic mailing. At least 150 messages were received which indicated that the survey was received by a

faculty member instead of a student, the respondent was unable to respond to the survey due to technical problems, or the survey could not be delivered to a valid address. These error messages are not included in the totals of valid survey responses. A total of 1,006 valid student survey responses were received and tabulated for a 14.4% overall response rate. Although this is an extremely low response rate that would be unacceptable for drawing conclusions about specific characteristics of the student population, it was found to be adequate for the purposes of this study into general trends of information seeking behavior. Further, this response rate is not inconsistent with an electronic mail survey reported by Berge and Collins (1996) with a response rate of 16%.

Analysis of Selected Data Elements from Initial Survey

As described in Chapter 3, two versions of the student survey were used in order to determine if students would respond in a different way if they were aware that the Einstein Library was the source of the survey. There were few differences in the responses between the two versions of the survey. For example, question 24 on the library survey (see Appendix A) and question 22 on the information survey (see Appendix B) are identical:

> Have you ever accessed information on the Internet/WWW for your course work (please read the selections carefully before making your single selection)?
>
> yes
> no, I don't need to
> no, but I am going to learn
> no, I don't know how

In both versions of the survey, the response rates to this question were nearly parallel as is shown in Table 1.

Table 1

Response Percentages to Question 24 from the Library Survey and Question 22 from the Information Survey

Response	Library Survey	Information Survey
yes	80%	78%
no, I don't need to	5%	4%
no, but I am going to learn	6%	7%
no, I don't know how	5%	8%

While the responses provide a significant indication that students are turning to the Internet for their course work, there is little difference in their willingness to admit this fact based upon their view of the Einstein Library as the originator of the survey.

There was another question from which the percentages of responses between the two versions of the survey were similar. This question varied slightly in the wording between the two surveys. In the library survey question 15 asked:

How important do you think library skills are for you to complete your course work?

unimportant
somewhat important
important
very important
no opinion

The similar question in the information survey was number 17:

How important do you think research skills are for you to complete your course work?

unimportant
somewhat important
important
very important
no opinion

The responses indicate that the students place a high value on library or research skills as shown in Table 2.

It is surprising that the information survey had a higher percentage of responses that indicated that research skills were very important, but the wording of the question may have accounted for this difference. Again, the percentages of the responses are largely in parallel.

While most other questions in the survey received such parallel responses, a noticeable difference in the responses between the two versions of the survey occurred in two areas. Question number 18 on the library survey asked:

Please list three major journals or other information resources in your field of research.

Blank lines were provided for an open-ended response. Question number 20 on the information survey was worded a bit differently:

Table 2

Response Percentages to Question 15 from the Library Survey and Question 17 from the Information Survey

Response	Library Survey	Information Survey
unimportant	<1%	<1%
somewhat important	4%	2%
important	21%	11%
very important	71%	85%
no opinion	0	<1%

Please list three primary information resources in your field of research. The responses were judged not for their actual or perceived value in the discipline but based upon whether they sounded like valid sources. They were rated with the values of valid, marginal, or non-valid. The sources may not have been valid from the point of view of an expert in the field, but if the student could come up with three sources that seemed to be valid and familiar to the student, this indicated some knowledge of the research process or at least limited evidence of their awareness of the sources. Based upon this judgment, the results were tabulated as shown in Table 3.

Table 3

Response Percentages to Question 18 from the Library Survey and Question 20 from the Information Survey

Response	Library Survey	Information Survey
3 valid sources	62%	13%
1-2 valid sources	13%	15%
marginal sources	3%	20%
non-valid sources	3%	36%
no response	15%	12%

The differences in the responses to this question between the two versions of the survey instrument are large enough to hypothesize some explanation. The difference may have been due to the wording of the question. Some students may not have understood the meaning of the phrase "primary information resources" while the phrase "journals or other information resources" is easier to comprehend. It is more likely that the students have an underlying understanding of the library and library resources that they developed from previous experience. Since the survey seems to have originated from the library, the students may have assumed that the library was trying to validate their own services and resources and thus students responded as they assumed they had been expected. Given

the confusing world of information resources that the students face, it is not surprising that they were not entirely consistent in their ability to understand and respond to this question.

The other major difference between the two versions of the survey was evidenced in the response combination to two particular questions. Besides the rating for validity of the responses in question number 18 on the library survey and question number 20 on the information survey, the response was tabulated as to whether or not the student provided Internet or World Wide Web based sources as one of their sources. In the library survey, 5 students (1%) provided a valid Internet or World Wide Web source as one of their responses when they provided three valid sources. In the information survey, 11 students (2%) provided a valid Internet or World Wide Web source as one of their responses when they provided three valid sources. Since many more students responding to the information survey included a valid Internet source while still able to provide three valid sources, this could represent a suggestion that the Internet and the World Wide Web are considered by the students as a basic information source as opposed to a standard library source or service.

Although students are making use of the Internet to locate information for their course work, it is unclear from this survey whether they are actually capable of locating valid research materials or are simply turning to this resource because it is readily accessible. Only a few students (5 on the Information survey and 3 on the Library survey) provided the URL (Uniform Resource Locator) or a specific reference to an Internet location or source. It is surprising that with so many of the students admitting to the use of the Internet for their course work (80% of the entire population), less than two percent

of the total survey population could name a valid Internet or World Wide Web source in response to this question.

Faculty Library Survey

A library satisfaction survey of the faculty was conducted beginning on June 3, 1997. This survey is included in Appendix C. The survey was distributed through electronic mail to all the faculty identified in the directories provided online by the various programs. The faculty surveys were distributed as follows: 37 faculty and administrators of the School of Computer and Information Sciences, 27 faculty and administrators of the School of Business and Entrepreneurship, 28 faculty and administrators of the Center for Psychological Studies, 15 faculty and administrators of the School of Social and Systemic Studies, and 63 faculty and administrators of the Fischler Center for the Advancement of Education. A total of 170 surveys were distributed. There was a total of 40 responses to the faculty survey (23%). This low response rate is again attributed to the use of electronic mail and is not inconsistent with electronic mail surveys previously reported. Thirty-eight were received through electronic mail; two were received through U.S. mail. The numeric results of the survey responses are presented in Appendix D.

Sample Data Analysis from Faculty Survey

The responses to the faculty survey indicate that the faculty are in agreement with the students on the use of the Internet for course work. 36 out of 40 faculty responding to the

survey believe that their students are using the Internet to complete their assignments. In a further question that asked if they encourage the use of the Internet, 32 of the faculty encourage the use of the Internet; six neither encourage nor discourage the use of the Internet; and only one faculty member does not encourage the use of the Internet.

The faculty are library users. 36 out of 40 faculty use the Einstein Library. A majority of the faculty responded that they are either "completely satisfied" or "satisfied" with the Einstein Library (28 respondents, 70%) and with the Distance Library Services Department (21 respondents, 52%).

Indicating their personal use of the Internet in course development, 17 faculty respondents have created their own Web pages while an additional 11 are working on Web pages. From those faculty with Web pages in existence or development, 15 include pointers or links to be used in locating research information for assignments. 19 faculty members indicated that they would like to be contacted by the Einstein Library to collaborate on adding links to their Web pages on locating information.

The responses to the question regarding current library services provided by the Einstein Library that are used by the faculty were not surprising. The highest response (33 responses) was for online access to journal and periodical articles. The lowest response (13 responses) was for reference assistance and guidance. When considering the types of services that should be available for their students, most of the faculty checked every response. The lowest response was for access to the Einstein Library (27 responses). The faculty provided some suggestions for services that could be provided for students such as Internet access in the library, fax back article service, and access to Internet bookstores.

Many of the faculty indicated that they use other libraries, usually libraries near their home or other academic libraries, in order to prepare class assignments. They use these libraries primarily for access to the book collection (23 responses) and online access to journal and periodical articles (17 responses).

Student User Satisfaction Survey

A library satisfaction survey of a select group of students was conducted beginning on June 3, 1997. This survey is included in Appendix E. The survey was distributed through electronic mail to all of the students who had provided narrative comments to the initial survey. This gesture indicated their willingness to participate in the process. The survey was distributed by electronic mail to a total of 83 students. There was a total of 34 responses to the student satisfaction survey received through electronic mail (41%). The numeric results of the survey responses are presented in Appendix F. The higher response rate in this survey can be attributed to the use of verified electronic mail addresses. The surveys were sent to the address from which the response to the initial survey was received.

Sample Data Analysis from Student Survey

Many of the questions in the student library satisfaction survey were used to judge the awareness of the students to the various services offered by the Einstein Library. For example, one questions asks if the student has used the library on the East Campus of

NSU. The initial surveys revealed that many students did not know about this branch of the Einstein Library. This question reminds students that the branch library exists. The long series of questions on 15 services offered by the Einstein Library is another way of making students aware of these services. This type of survey question functions as much as a marketing piece for library services as a method of gathering information. In fact, some of the questions were suggested by the librarians at the Einstein Library in order to point out some of their newer or less well known services.

On the initial survey, many students complained of a lack of Web-based access to the library. Upon further investigation, it was discovered that Web-based access points had been developed by the Einstein Library and were available on the Web pages of the Library. (see, for example, *Databases and Other Resources* (n.d.)). The question on the student satisfaction survey regarding Web-based access was nearly evenly split (16 - 18 responses) between students that were aware of this service and those that were not aware of the service. Even fewer students (9 responses) were aware of the Internet jump start page divided by topic that is provided through the Einstein Library. Only three students were aware that the Library offers hands-on training sessions.

Most of the basic library services are familiar to the majority of students. Most were aware of the library catalog, the ability to request books and materials online, the computer access to full-text journal articles, interlibrary loan services, online database searching, and mail delivery of materials.

When viewed in comparison to the faculty satisfaction survey, a much smaller percentage of the students were "completely satisfied" or "satisfied" with the Einstein Library (13 students, 38%), while about the same percentage were satisfied or completely

satisfied with the Distance Library Services Department (18 students, 53%). Many more students indicated a "neutral" response to these questions than the faculty respondents.

24 students indicated an interest in Web-based tutorials on locating information and using library resources. Many students responded that they would be willing to spend "whatever it takes" to go through such a tutorial. Some of the students indicated that they would spend as much as two to four hours in this pursuit.

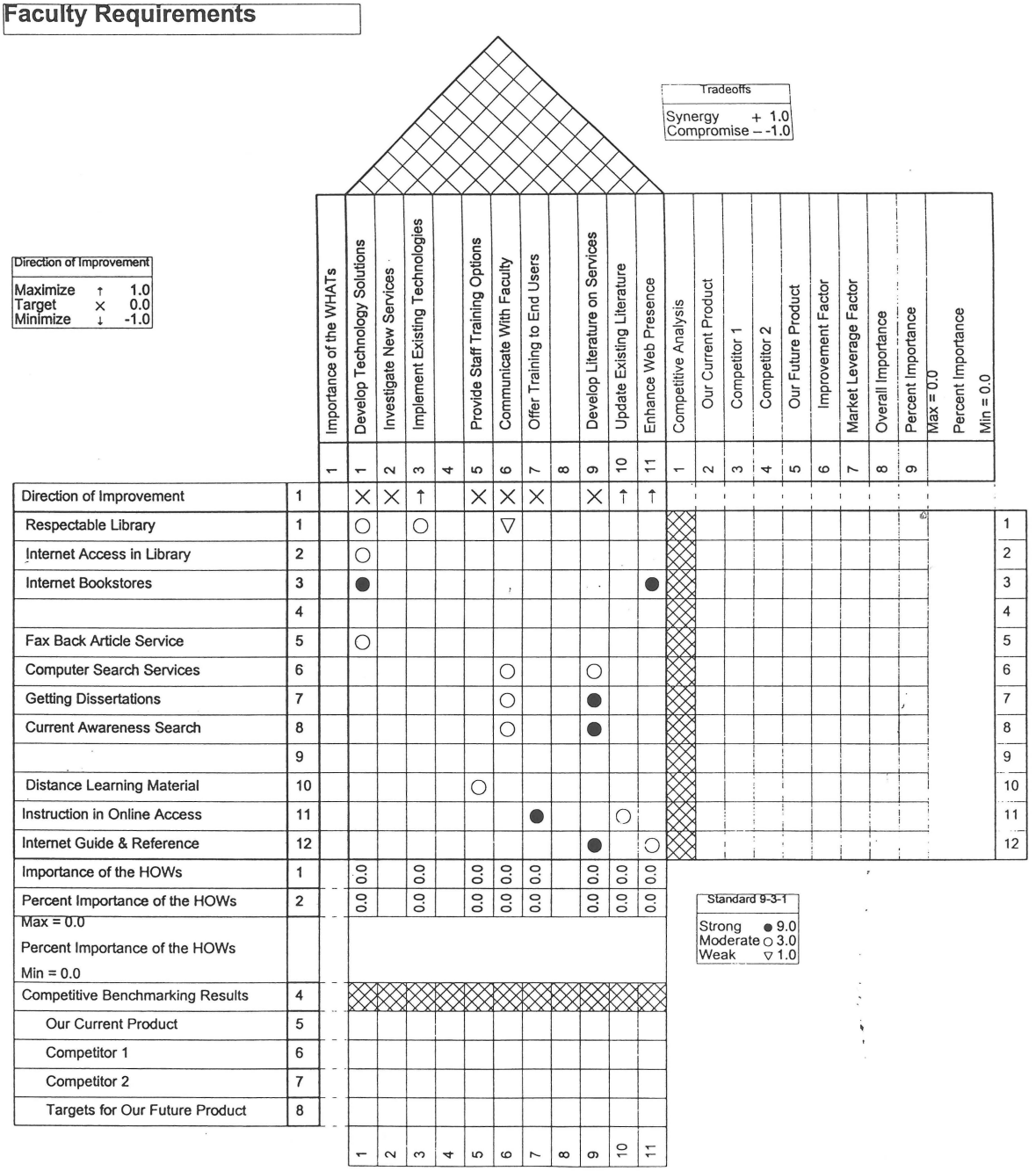
Quality Function Deployment

The Quality Function Deployment (QFD) methodology serves as a tool for translating the specific service requirements of the patron or user, also known as the voice of the customer, into quality characteristics that can be directly applied by the organization (Guinta & Praizler, 1993). This method simplifies the process of evaluating and meeting the needs of the patron or user. Through the use of a graphical matrix, or house of quality, an initial measurement of what is important to the user is mapped out (Daetz, Barnard, & Norman, 1995). The matrix can then be used as a planning tool. Although more often used in design and manufacturing environments, QFD has been successfully applied in the service sector (Eureka & Ryan, 1995).

As a simplified experiment in the application of QFD in the service sector, specifically the academic library environment, the suggestions of the faculty provided in the library satisfaction survey were used to create a quality matrix. Serving as the voice of the customer, these quality requirements of the faculty were then mapped against possible library procedures and methods of achieving these goals.

Table 4

QFD Matrix of Faculty Requirements and Library Quality Characteristics



The patron requirements were subdivided into three separate areas: access, services, and training. They were then mapped out on the left side of the matrix (see Table 4 for the full QFD matrix). Under the access category, three requirements were included: respectable library, Internet access in the library, and Internet bookstores. Under the services category, four requirements were included: fax back article service, computer search services, getting dissertations, and current awareness searches. Under the training category, three requirements were included: distance learning material, instruction in online access, Internet guide and reference.

The quality characteristics that can be used to bring about the requirements were also subdivided in the matrix into three broad areas: technology, personnel, and marketing. Under the technology category the following items are listed: develop technology based solutions, investigate new services, fully implement existing technologies. Under the personnel category the following items are listed: provide staff training options, communicate with faculty, offer end user training. Under the marketing category the following are listed: develop literature on current services, update existing literature, enhance WWW presence.

The web of the matrix in the lower right side of Table 4 is used to match up the specific user requirements with the quality characteristics that can be implemented by the organization in order to fulfill the requirements. In this way, the areas upon which the organization will need to focus to achieve all of the requirements are brought forward in a graphic way.

A full QFD development requires a process of mediation between the user and the organization (Guinta & Praizler, 1993, p. 48-59). By studying and reacting to the simple matrix that was developed, the users can further clarify their requirements. At the same time, through the use of the matrix, the organization can expand upon and quantify the characteristics of their organization and staff that would be required to fulfill the expectations of the users. In the further development of the QFD matrix, each of the requirements would be weighted by the patrons in order to develop priorities in the quality characteristics. This sample QFD matrix begun in this study would then be expanded and refined throughout the process.

From this simplified view of the QFD process, the groundwork of the methodology has been established. The fully developed matrix would provide a vehicle for communication between the users and the organization. All of the user requirements are clearly planned out and labeled in the matrix. All of the quality characteristics required by the organization are also clearly described. The matrix can thus be used to clarify objectives and plan out a course of action for the organization.

Findings

Information and Libraries

Based upon the similarities in the responses to the two versions of the student survey, there is still a definite association between libraries and information. Even on the version that did not specifically mention the Einstein Library, many students offered suggestions directly to the library in their narrative comments. The comments from the

students indicate that it is not easy for distance education students to locate the information that they need to complete their course work. Although they associate the library with information, many of the students expressed frustration at the lack of easy access to any library and the need for better access to more information, particularly online full-text article sources.

Many students do not indicate the necessity for formal training to locate information. A majority of the students (55% of the total survey population) claim to have been "self-taught" in the use of libraries, or the Internet, or their other selection of primary source for research information. From some of the comments provided by the students, this does not appear to be because of a lack of available training options, but because the information-seeking skills seem to the students to be simple or obvious. Although many students rated library skills or research skills as important, only a minority could indicate an organized place where they obtained those skills.

Library Use

According to the results of the surveys, students and faculty alike are library users. Few respondents admitted to completing their work without some reliance on a library somewhere. There were a few students who commented on the "old fashioned" ways of finding information in the library as opposed to the "modern" methods available online or through the Internet. Many students expected Nova Southeastern University, as an innovator in distance education and information technology, to be providing better and more modern facilities for locating information. Based upon the responses in the Student Library Satisfaction Survey (see Appendix F for detailed results), some students did not

appear to be aware of the broad scope of services and facilities that have recently been introduced by the Einstein Library.

A small percentage of the students (13% on the library survey and 14% on the information survey) provided the response of "librarian" for their instruction in using their primary source for research information. This is even more surprising when 47% on the library survey and 50% on the information survey indicated one of the library responses as their primary source for research information. This response reveals that librarians everywhere may not be adequately educating their patrons to use the resources that they offer.

Importance of the Internet

As pointed out above, students and faculty agree on the use of the Internet for research. According to the results of the Faculty Library Survey (see Appendix D), the majority of the faculty know that students are using the Internet to complete assignments and they are encouraging their students to use the Internet to locate research information. Many students complained about the lack of ready access to the Internet through the Nova computer system, and yet, they are finding some method of getting the access they require. Unfortunately, based upon the low number of students that can cite valid resource sources on the Internet as mentioned above, there must be something missing in educating the students on using the Internet efficiently. Although they admit to using the Internet in their course work, the students may be spending more time than necessary to locate information on the Internet since they are not fully aware of the resources available.

Based on the survey results showing that 21% of the total survey population in the initial student survey are using the Internet as their primary source of research information, some direction should be provided in the use of this information resource. Faculty must be aware that students are turning to the Internet before other, more traditional sources. Bibliographies and course summaries should include Internet sources and guides to locating information. Many faculty indicated that they are providing or developing Web pages for use in conjunction with their courses. This could be an initial indication that many faculty are aware of this development and are taking steps to assist their students.

Electronic Mail Surveys

The very low response rate in the initial student survey (14.4%) would not be adequate for many types of research. As has been noted, the response rate achieved here is consistent with response rates to electronic surveys that have been reported in the literature (see e.g. Lou, 1994). More sophisticated methods of gathering and verifying electronic mail addresses must be developed before electronic mail data collection can be depended upon for scientific research. There are other problems to be confronted such as confidentiality, security, and verification of the source of the responses. Several of these points were raised by faculty during the course of this research.

Due to the very low response rate to the initial student survey and the low response rate to the faculty survey, it is necessary to consider if there was a self-selecting population responding to these instruments. It is definitely true that many students and some faculty admitted to their inability to respond to the survey due to a lack of

knowledge or ability to use the technology. Some students and faculty members sent messages indicating that they could not figure out how to operate their electronic mail systems in order to negotiate a response. Several of these were able to complete the survey after receiving a few hints on replying though electronic mail. There is the potential that only the more technologically literate or aware were able to answer the surveys. Unfortunately, this potential to weigh the results on the side of technology is apparent and cannot be overlooked.

Summary

A variety of surveys was prepared and distributed to students and faculty in a number of distance education programs of Nova Southeastern University. Student surveys were developed to assess the ability of the students to locate and use information resources. Results of the surveys indicate that a large percentage of the students (more than 75%) are using the Internet for course work. However, not as large a percentage are able to specifically identify the Internet resources they are using. Students and faculty were also surveyed regarding their satisfaction with the library services offered by the Einstein Library at Nova Southeastern University. A larger percentage of the faculty (70%) than the students (38%) are satisfied with existing library services. The satisfaction surveys also reveal a move toward the Internet and the Web as information resources. The QFD methodology is used to graphically compare the results of the faculty satisfaction survey with actual procedural changes that could result in service improvements for the library.

Findings of the research include a reaffirmation of the close connection between information and libraries and the importance of libraries to both faculty and students.

Chapter V

Conclusion

Implications

A New Model of Library Service

Based upon the results of the student and faculty surveys, a new model of library services for distance education is needed that will appropriately integrate traditional information resources with newer electronic options. Students do not seem to have a clear perspective of the range of services available through the Einstein Library. Further, although more students are using the Internet in their research, they seem to be unaware of the role of the library in making this resource available to the distance learning community.

An important decision in building the library service model is choosing between an open and closed model. Covi and Kling (1996) described the difference between open and closed systems in their study of the use of a digital library by faculty members. According to these authors, a closed system is one in which outside influences do not have an impact on the outcome or the workings of the system. An open system is one that is seen in context, or that reflects the impact of outside influences. Covi and Kling use the example of digital libraries developed for elementary school students. Although some try to see digital libraries as closed systems or as exclusive options for schools, it is

better to see them as open systems or as additional sources of information that students can use.

Open systems consider, or at least admit the existence of, other outside forces. Closed systems limit the possibilities and seek to answer all questions within themselves. Any library service must be modeled as an open system. From the perspective of the librarian, there are multiple demands on the librarian that limit the time available to devote to serving library patrons (Stalker & Murfin, 1996). The services provided by the library will not be the exclusive source of information for any individual student or faculty member. Rather, the library and its services will be one more tool that can be used to gather and help analyze and synthesize information. While an open system model cannot take all factors or situations into consideration, it must assume that there will be outside influences that impact the information gathering methods of the users.

Librarians also have other jobs besides providing information and assisting the patrons (Stalker & Murfin, 1996). The other jobs of the librarian include providing access and study space, processing materials and information, preserving materials for future use, and strategic planning to meet the needs of future patrons. An open system must recognize the existence of these other duties and thereby place development of a new model into a total institutional perspective.

Students are using many different sources for their research. As exhibited in the survey of graduate students at Nova Southeastern University conducted in this study, many students are turning to the Internet and expect to find everything they need online. As information is becoming ubiquitous, librarians must find some way to distinguish themselves and the services that they offer from the rest of the information world. A

decision must be made on whether to offer special services and facilities developed through the library or to simply direct the students to the information that is already available. A large part of this decision is an economic one. If the funds are not available to improve services and facilities, there is very little that librarians can do to supplement existing services.

The institution, and the librarians, must determine what makes the library an important contributor to the institution. The only source for this information is the collected knowledge of the administration, faculty, and students. For the purposes of this study of the Einstein Library, this knowledge was clearly delineated in the Quality Improvement Plan for Nova Southeastern University published in 1995 (Nova Southeastern University, 1995). As stated in that document:

> The primary purpose of the University library is not only to provide books, journals, and other instructional materials in support of the academic programs of the university, but also to encourage the formation of lifelong research tools and skills. To that purpose, the library must provide and maintain a growing collection of current materials; a modern, technologically efficient physical plant; a well qualified, professional staff; leadership in promoting library use and access; and ongoing financial support.

The University seeks to provide a diverse library environment that meets not only the basic information needs of the students and faculty, but endeavors to educate the students and provide a full range of information options.

In providing library services to a user population, librarians must select from a broad range of potential services and provide a sense of balance between those services (Wilensky, 1996). As exhibited in the student surveys, students are seeing too much of a dichotomy between traditional library services and facilities and new methods of locating information such as the Internet and the World Wide Web. Based upon the survey

responses from the students, Figure 1 represents in graphical form the current view that students have of the available information resources. The traditional library is on one side of the information spectrum. From the perspective of the student, the library provides traditional book and periodical resources. On the other side are the new technologies, the Internet, and other electronic methods of locating information. The students experience these two resource areas as separate worlds. There are some electronic resources available in text format, that accounts for the fuzzy area in the middle of the spectrum. Many students learned their information seeking behaviors on their own or from computer services staff rather than from the librarians. They do not necessarily see the library as a primary source for all the information they need to supplement their course work.

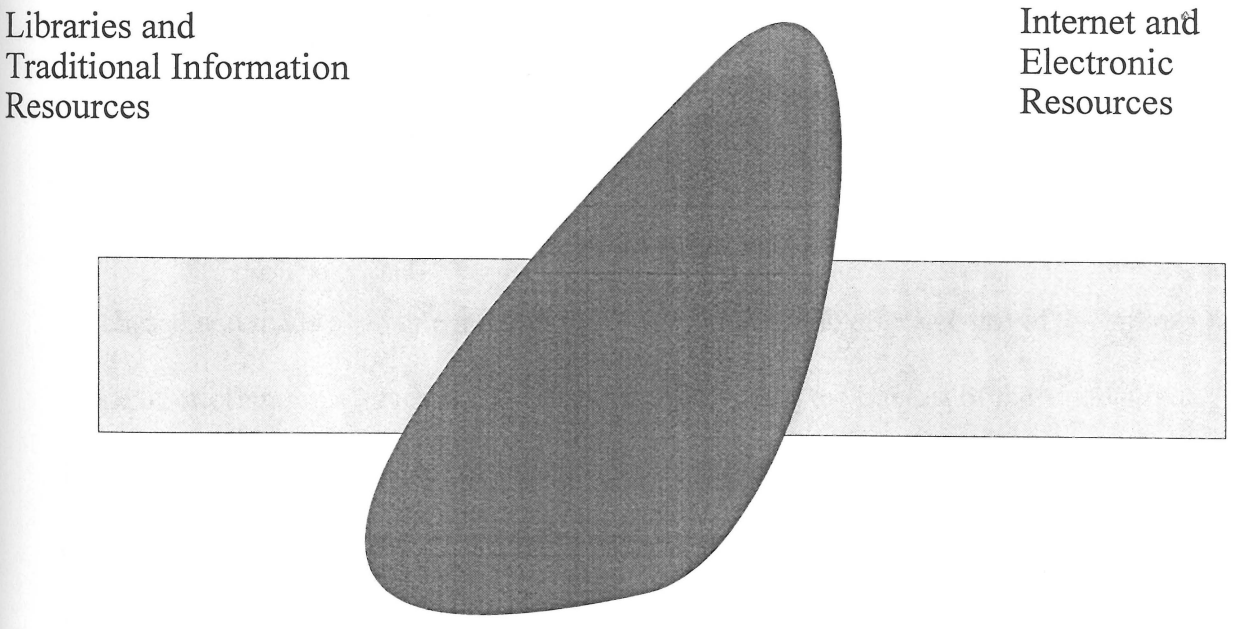


Figure 1. The Student's View of the Information Resource Spectrum. The traditional resources are seen on the opposite side of the spectrum from the modern electronic resources. The darker area in the middle is the small overlap between the two sides.

Librarians need to recognize the importance of the Internet in the information toolkit of the students and provide links to those sources and training in how to locate and access Internet resources. As described by Lynch (1997b), the Internet is not designed to provide an organized method of information retrieval. Students need assistance in navigating the anarchy of the current Internet. Librarians have the ability to balance the full range of resources that are available and present them as options to the users. Based upon the evidence of information seeking behaviors of students and faculty uncovered in the survey results, Figure 2 illustrates the balanced environment that can be achieved and promoted by the librarians. The larger model at the top (Item 2a) represents the full range of information products as they are available together. In this model, the library becomes the center for information in all forms. Balanced, knowledgeable use of all sources and services can be attained. Traditional as well as electronic library services are thus embedded in the list of all possible information products and resources.

Under past forms of information storage and retrieval that were utilized and promoted by traditional libraries, this balance was not achieved. If librarians maintain control and only provide traditional library services and promote electronic resources purchased and made available through the library, there is no effective use of the entire range of information sources and the librarians risk losing the interest of the student (see Item 2b). In situations where the patron maintains control (see Item 2c), there is no effective use of the resources. The patron selects electronic products or personal sources, but does not gain the benefit of the full range of information products. There may also be the situation in which patrons control what they use, but they only select electronic products available from the library and outside sources and their other personal sources

(see Item 2d). Again, there is no balanced utilization of the full range of information products in this example.

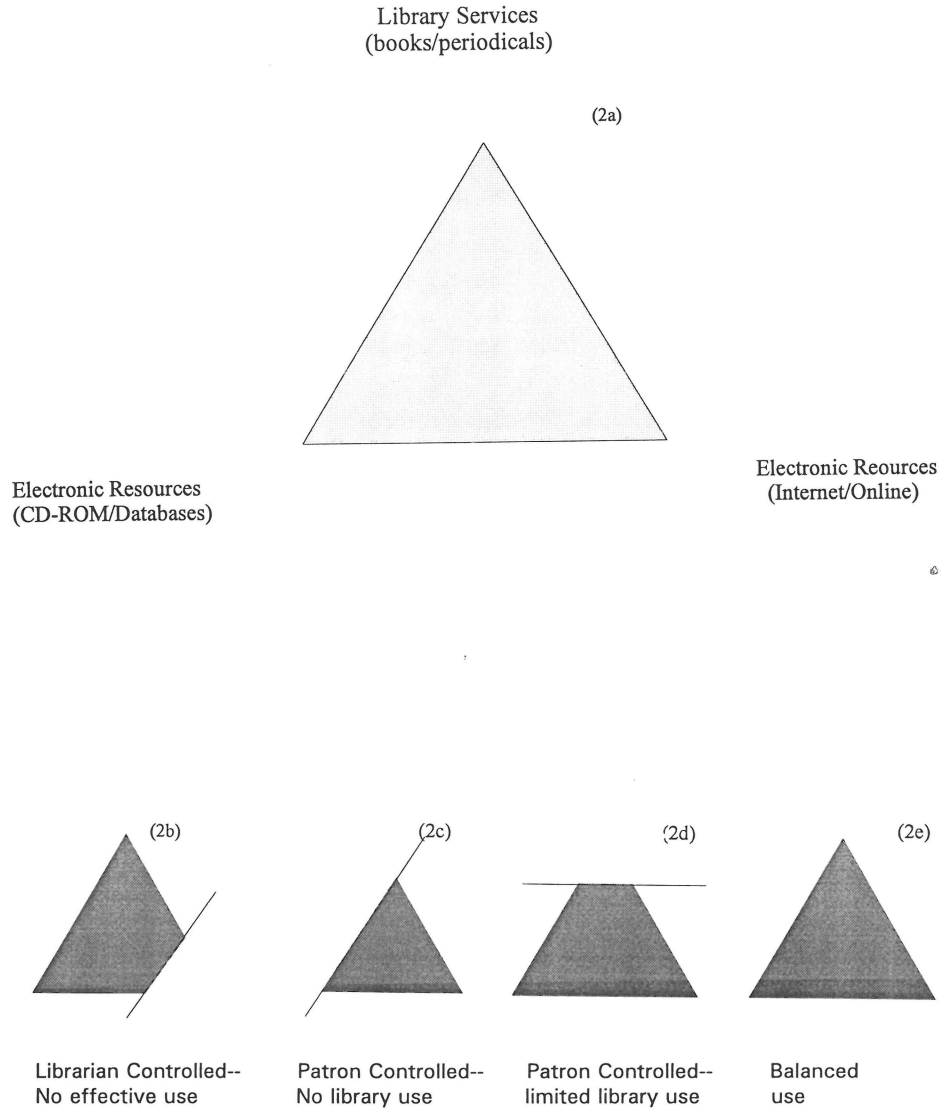


Figure 2. A Balanced Model of the Modern Library Environment.

Under the balanced model (see Item 2e), librarians control the flow of information and understand how to blend together the best aspects of all of the various resources. This balanced model will require much more effort on the part of the librarians. They must maintain control not only of the internal and external sources of information, but also over the technology and patron training. This will require additional knowledge of the various sources of information as well as the technological aspects underlying information delivery. Rather than giving over control to computer experts, librarians must develop the skills necessary to locate, acquire, deliver, or maintain various sources of information in a variety of formats.

Where in the past, there was too little information readily available to students and librarians had to struggle to increase the amount of information available, in the new information environment there is too much information available. Students must develop new skills to accommodate this greater access to information (Fulton, 1998). In order to assist students in developing these skills, librarians can occupy the new role as filtering agents, scanning the entire world of information and selecting or presenting the choice resources that will be useful for students. This can be accomplished through the authoring and use of guides and user aids, by the creation of World Wide Web pages that provide an initial starting point for effectively accessing the Internet, or by working with faculty to create links to information resources within their own World Wide Web pages.

New directions for library service in distance education

As stated above, there has been a very weak link provided in the literature between distance education and library service. Few institutions seem to understand the

importance of access to information, particularly for students studying at a distance. Contrary to this link exhibited in the literature, this study has shown the importance of the library to the distance student population. As indicated by the survey responses, a large majority of students recognize the importance of research skills. Most students and faculty claim to use the library in their studies and research. Although the Internet is becoming an important source of research information (Anderson, J., 1995), many students and faculty still rely on library services such as interlibrary loan and online databases provided through the library for much of their research.

Library service to distance education students must provide a rich supply of information sources (Blandy & Libutti, 1995). It must also provide the necessary education in locating relevant information from those sources (Rader, 1995). Students do not have a good resource for this education in information-seeking (Anderson, J., 1995). Many of them have been self-taught in using the Internet and libraries. Librarians must find new ways to market their existing services as well as the new services that will be developed using new technologies.

As has been mentioned, the future of the electronic library is uncertain as technology changes rapidly. It is difficult to predict the appearance of any industry even five years into the future, and the information industry is extremely complex. This study presents a model of the way library services can be delivered to students in a distance education setting and sets some new goals for librarians of the future. The model has been developed to include traditional library services as well as new research methods and technologies that librarians must incorporate into their toolkits to serve current and future library patrons.

Recommendations

There are a broad variety of recommendations generated from this study. The results of the surveys have served to solidify some of the recommendations that were proposed early in this research process. Below are some of the various directions that can be taken and some suggestions for areas that require further study.

Surveying User Needs

The way in which library user needs are assessed and studied is a common library science journal article and conference topic. Libraries conduct surveys and hold focus groups to study the needs of their users and therefore validate or enrich their own existence or policies. A broad variety of sample surveys used in college libraries is gathered together by Adams and Beck (1995) for the Association of College and Research Libraries. Many other instruments are available to ascertain the opinions of the users (Gover, Pappas & Wykoff, 1995; Lebowitz, 1993; Peterman & Schultis, 1995). However, the way that libraries use the information gathered is not always appropriate. The example discussed below illustrates that these maneuvers can simply be a means to justify what the library administration already wants to do.

As an example, Meldrum, Johnson, and Ury (1995) rely upon input from users to implement library changes. Unfortunately, all of their surveys of users were in response to programs that had been developed by the library or problems from the point of view of the librarians. There is no attempt to allow the users to express their opinions outside the context of existing programs and services. In particular, the library wanted to expand

their hours, so they surveyed users to see if they would benefit from expanded hours. The positive response that they received through surveying the users is exploited to justify the extra expense. This attempt to gain user support is more like a marketing effort than a true measure of the present and future needs of users. This type of marketing survey question was even used in the current research when several questions were added to the student library satisfaction survey at the request of the librarians at the Einstein Library.

Some surveys reported in the literature have found that users do not always know or understand the library services that are already available (Gover et al. 1995). Perhaps additional education and marketing on library services should be a part of the survey process. The survey in this study revealed that many users do not know about services that are already available through the Einstein Library such as the branch library on East Campus.

Some library administrators have emphasized the need to put users at the center of library service (Cline, 1993). The needs of the user should drive both the support of existing services and experiments with new services. How can librarians actually measure what the user truly needs? For years, librarians have been relying on their knowledge of sources or simply on intuition to suggest what they determined to be the appropriate services to meet the needs of their particular user group. After all, users cannot tell a librarian what they need if they are not aware of what is available. The librarian often has been viewed as a guide or mediator between the users and the potential services. Are librarians really serving the needs of the users if they do not open up all possibilities for them? There must be some way to gather more open responses from users.

However, open ended questions, such as those that have been used in this research can cause problems. Are college students writing term papers based upon what they read in the newspapers, or see on television, or bump into on the Internet? According to this investigation, fully one-quarter of the graduate student population in the programs surveyed in this study are using the Internet as their primary source of research information. Now that this fact has been uncovered, the program directors at Nova Southeastern University must decide if this is the appropriate direction for their students to make in their research.

Further, is there enough funding to provide what users really need, or will they be disappointed when libraries cannot accommodate the expectations of the users? This study revealed that students want more full-text periodical sources available online. These are very expensive services to provide. The library must make very important funding decisions in attempting to provide these sources. As has been shown, a methodology such as QFD can be used to quantify user needs and channel funding into the appropriate service areas.

The surveys used in this dissertation inquiry have been an attempt to go beyond traditional methods of surveying users for their needs. The application of two versions of the same survey was an experiment in different approaches to pulling information from patrons. Since the two versions of the survey provided nearly parallel results in most cases, the provenance of the survey is obviously not the problem. It is interesting that some of the services that students professed to need or desire from the library are already being provided. Clearly, there is a need for better marketing of some of these services to the students and faculty.

In order to find possible solutions to the dilemma of meeting the needs of the users, perhaps other disciplines can be explored. One area where the opinion of the user has become important is in user-centered computer interface design as described by Hix and Hartson (1993) and Schneiderman (1992). This recent trend is the outcome of years of computer and machine design that had neglected the user, a point illustrated in word and pictures by Norman (1988). Suddenly, designers are starting to ask the users what they want and need. This has delivered some surprising results. Early microwave ovens are a good example of design that did not consider the needs of the users (Norman, 1988). These devices were designed with more features than necessary. The full-featured control panels now are being pared down to a simple start button. The same is true with many computer programs. There may be lessons for librarians in user-centered design of computer software, hardware, and even toasters. Perhaps the changes that have been driving the move to user-centered design would also be appropriate in the library setting. An ideal expansion upon the current research would be to conduct focus groups or interviews with faculty and student users to further clarify their needs.

One institution that has seen this connection clearly and is attempting to coordinate library user needs and computer interface design is the Cornell University Mann Library (Garrison, 1993). This library has an Interface Designer on staff in order to package information and provide library-produced pathways to meet user needs and requirements. By producing the electronic pathways for information access, the library becomes responsible for networked information access for the users. For example, the library opened the first microcomputer center on campus and devoted staff to providing computer support. Along with other academic libraries, the Mann Library is investigating

the integration of networked information into the library collection to expand the resources available.

From the voice of the users expressed through these surveys, it is clear that the Einstein Library should investigate new methods of providing electronic services to students and faculty and create avenues to integrate electronic services into the traditional services. Interesting suggestions have come from the students and faculty themselves. Services such as fax back of articles and an Internet connection in the library with adequate access and equipment would be in direct response to a need expressed by the faculty and students in this research.

The needs of the library user must be identified now in order to be prepared for the digital library of the future. Imaginative projects are being carried out as part of the Digital Library Initiative (Atkins et al., 1996; Paepcke et al., 1996; Schatz, 1996; Schatz & Chen, 1996; Smith, 1996; Wactlar, Kanade, Smith & Stevens, 1996; Wilensky, 1996). These projects are seeking new ways to deliver information to users on a broad scale. The digital library of the future will provide access to information in ways that cannot be imagined utilizing existing technologies. These future libraries may be able to provide this access with no physical collections, and therefore, no buildings. This will further remove the connection between physical libraries and librarians and could increase the distance between the librarian and the user. Likewise, new ways to determine what patrons actually want and need in order to utilize the new technologies that are under development for information delivery in many formats must be delineated.

The present study has focused on determining the needs of a select library user population. Further research should be conducted among other groups of library users.

These results of this further study can enable the Einstein Library to develop and provide future services to students and faculty.

Voice of the Customer

Although the methodology of Quality Function Deployment (QFD) has already popularized embracing the "voice of the customer" or making use of the direct opinions of the customer in the manufacturing industries, there has not been a significant adoption of this methodology in the service sector. Through this study, it is shown that the QFD methodology can be transferred to the service sector and can be an effective planning tool for libraries.

Through the use of the QFD matrix, the opinions or voice of library patrons such as students, faculty, and administration can be transformed into specific research applications in order to form the basis for a model of library service. Additional research could uncover new ways to adapt the QFD methodology into the service and academic sectors.

QFD is a relatively new methodology. The future adaptations of QFD in industry and the service sectors will increase the ability to determine and analyze the "voice of the customer" and put these opinions to use in improving products and services. Additional methods of assessing service quality through the "voice of the customer" have been proposed. Calvert and Hernon (1997) detail more than 90 elements that contribute to their twelve factors of service excellence in their ongoing research in New Zealand. This research reveals the multitude of diverse issues that are involved in satisfying the customer.

Emerging Technologies and the Library

Academic libraries have often been dependent upon their parent organizations to provide the technological infrastructure necessary to support the services that must be provided for users. The infrastructure required to support emerging applications for information delivery are expensive (Halfhill, 1996). Emerging alternatives such as wireless connectivity require entirely new infrastructures to implement. Network speed and capacity have an impact on the ability to deliver multimedia information to the user. Libraries are not always in control of these basic delivery elements. As libraries, including the Einstein Library at NSU, move forward into new areas, driven by the needs and demands of their users, they may not be willing to wait for their parent organizations to upgrade.

The decision to upgrade networking technologies may be up to the library (Cutright & Girrard, 1996). For example, advanced multimedia applications in libraries require high speed network links. As described by Jafari (1996), the Indiana University Purdue University Indianapolis project will provide interactive multimedia on every computer in the library. This type of technological innovation will require the library staff to build a sophisticated network within the library without depending on the technological expertise of the parent academic institution. One of the suggestions brought forward by a faculty member in this research was the addition of an Internet connection and adequate printer in the library for use by the students in downloading and printing information from the Internet. Even a task as simple as selecting a local Internet Service Provider (ISP) requires a knowledge of networking technologies (Stites, 1996). This study did not seek to determine if the Einstein Library has adequate personnel and funding to move forward

in the implementation of emerging technologies. Further study in this area is recommended.

Determining the costs of educational technologies is complex. The equipment and network costs must be added to the training and support costs. Ingram (1996) suggests an incremental approach, phasing in the technology as the institution can afford it. Some telecommunications technologies, such as ISDN and ATM are not fully developed and can be a risky investment in the library environment (Schuyler, 1996), but, as suggested by Learn (1995), libraries have to start planning now for their eventual implementation. Some examples of experiments in using these networking technologies include the SuperJANET project at the London Business School (Jameson, Hobsley, O'Hanlon & Buckton, 1996) and the multimedia delivery experiments at Stanford University (Harris & DiPaolo, 1996).

Although the surveys did not reveal many needs in the area of multimedia support from the library, the time is not far off when there will be a multimedia component to all sources of information. Applications are being developed that enhance straight textual information with graphics, audio, and video. A simple Internet connection now requires the ability to transmit multimedia information. The librarians of the Einstein Library must act now to provide the infrastructure necessary to support these future requirements.

There are many choices to be made in selecting the appropriate technological options. One of these decisions is explored in the study by Duin and Archee (1996). They compare electronic mail to Internet Relay Chat as a collaboration mechanism for students. The simple decision between a real-time and a delayed time communication medium is complicated by the social and instructional questions involved in using these

technologies for communication. For example, the real-time communication channels necessary to conduct a proper reference interview between a patron and a reference librarian requires the appropriate technology and librarians must be able to select and effectively implement the appropriate technologies in a real-world setting.

ATM networks are being used to deliver large stores of information. The French National Library plans to use ATM products for the audiovisual library system ("French National," 1997). This conversion assumes a full-scale transition to digital storage of the entire library collection. ISDN can support a variety of library applications including Internet access, remote LAN access, and videoconferencing (Finneran, 1996). As the costs of these technologies are slowly coming down ("The evolving," 1996), they are becoming affordable options for academic libraries and should be investigated by the Einstein Library for expanding service options.

A serious potential complication of venturing too quickly into emerging technologies is experimenting with technologies that just will not work. Gable (1996) describes some of the current problems such as those associated with videoconferencing. He stresses that support and planning are still needed to incorporate technology into the library setting. The survey results indicate that many students are unaware of many services already available through the electronic library. Making additional changes or offering additional services through the implementation of emerging technologies may not be the answer. Given the discomfort and misapprehensions expressed by some of the students surveyed in this study, the Einstein Library should exercise caution in their ventures into new technologies. At the same time, some degree of experimentation into new arenas is necessary in order to deliver the quality service demanded by the users.

Library Models

The state of electronic information is constantly changing (Strangelove, 1996). Since the popularity of the World Wide Web began increasing in the mid-1990s, it is difficult to predict from month-to-month the future state of electronic information (Koopman & Hay, 1996). The impact of this explosive growth is illustrated in the current confused status of the population in this study. A small number of students seems to be completely familiar with the Internet and available sources. Several students were able to provide URLs (Uniform Resource Locators) for their favorite research sources on the Internet. Other students are just beginning to explore the many folds of the World Wide Web. Only a few of the students have not yet seen the need to take this step.

As was shown by their responses in the survey, the faculty is encouraging the use of the Internet to supplement course materials. Although no common ground was predicted before this research was conducted, it is now apparent that there is a need to assess where the students are getting their research information and if they are properly trained in locating the information they need.

Further, librarians must plan for and adapt to these new methods of locating information. Training in electronic information retrieval methods is an important element in improving library service (Stalker & Murfin, 1996). While in the past it has been a fairly evident task to build a library book collection based upon the projected needs of the faculty and students, it is much more difficult to produce the plan for an electronic collection of materials that cannot be experienced or even imagined. For example, how can librarians plan to train students on locating information sources on the World Wide Web and Internet when new search engines are introduced every month? Students,

faculty, and librarians must discover these new tools together and together build new paths to this information.

Librarians should maintain a virtual map of available sources and proposed methods for navigating to those sources. Librarians can use their skills in collection development and organization of materials to seek out the most appropriate resources on the Internet and provide organized links to those resources. In this way, they are charting a course through the difficult maze that is developing on the Web and the Internet. New approaches to research may be found along the way and these should be integrated into existing methods. This creates a much more cooperative and mobile information environment.

As noted by List (1995), some librarians were overwhelmed by the Internet. As pointed out from the survey results, some students are discovering for themselves the wealth of information available on the Internet without waiting for the direction or assistance of librarians. Further research is needed in identifying effective ways for librarians to lead the way for the users in mapping out paths to new sources of information.

Role of the Librarian

As electronic information becomes more widely available, issues involved in providing and restricting access to specific communities of users become more important. The librarian has the power to become the future gatekeeper to the networked information environment by holding the keys to access rights for individuals or groups of users (Lynch, 1997).

Work Habits of Librarians

As the results of the surveys have shown, students are doing more of their own information gathering and document delivery. They are relying on the Internet for more information. They expect to find full-text articles made available online by libraries. They want to do more of their own searching for information without the mediation of a librarian. As students take on these new tasks, this frees up more time for librarians to be doing other things (Zietlow & Kragness, 1996). Although this can be seen as an advantage for the time management and planning abilities of the librarians, this will have a significant impact on the students and their ability to locate the information they need. How much time are they now spending on gathering their own information, finding their own paths through the virtual library, and contracting to have documents and resources delivered to their desktop? Is this shifting of responsibilities appropriate in the academic setting?

Students are spending much more of their valuable time locating their own references and tracking down information from electronic sources. These are tasks that used to be handed over to academic librarians. Students have better access to information resources in digital formats. With the immediate information needs of the students served in this way, librarians may have more time to devote to new opportunities. For example, a large number of faculty members expressed an interest in collaborating with librarians to provide information links on their Web pages. This type of collaboration is recommended by Kubala (1998). Such new responsibilities will uncover outlets for the creative talents of librarians. At the same time, librarians must also provide educational opportunities for students in order to improve their ability to locate information on their

own. Librarians must adapt to their increasing role as teachers in academic environments. Although there has always been a teaching role for academic librarians, this role will become stronger as students gain some sense of independence in locating and accessing information.

Loss of Commonality

As technology provides individuals with the ability to locate personal pools of information, the sense of commonality that is usually generated in the academic environment will diminish. This can be seen through a number of examples both from academia and the general population. On the SCIS Information Page, students select what they want to see by creating an individual newsletter. The student no longer reads static information as provided, but the student has the ability to sift out the information of interest specifically to them. In a similar fashion, with satellite and cable television, individuals can shut out information that they do not want on their system. There are no longer common stations that everyone watches. There is an individually selected grouping of information. On the World Wide Web, researchers select those paths that are interesting to them. Because there is so much information available, it is unlikely that two people share the same experiences or paths to information.

This growing loss of commonality can be extended to the university or college environment. Within disciplines, there is a body of literature, knowledge, and custom that is passed from the learned to the learning. Distance education and particularly open electronic libraries abolish these important information linkages. Can colleges still exist if there is no commonality or collegial sharing of information and experience among the

students and faculty of one institution? The students surveyed at Nova Southeastern University displayed a wide variety of experiences and knowledge regarding research information. The survey revealed no common pool of resources or information.

New technologies such as electronic publishing, digital communications links, and wireless networks, while facilitating information sharing, also have the potential to take away a sense of the commonality of society. Can there be any true learning once these communal links have been changed? It is also possible that new types of communities will be discovered by applying the new technologies as described by Doheny-Farina (1996). He details some of the hazards and advantages of making the computer the center of our lives. Virtual communities that create new kinds of neighborhoods can be established. Perhaps similar new academic communities will also be developed through the use of networks, telecommunications, satellite conferences and similar developments. On the other hand, Lever-Duffy, Lemke and Johnson (1996) suggest that the Internet may be useful in eliminating the academic isolation brought about by distance education. There is an interesting dichotomy between new technologies moving individuals further away from each other or bringing them closer together, particularly in the academic environment, that should be explored in further research.

Suggestions for Further Research

There are many other areas related to the current research that need to be explored. This area is changing so rapidly, that the same survey could be repeated in a few months with completely new results. The percentage of students using the Internet for their

research was surprisingly high. It is expected that more students will be relying on the Internet and other electronic sources for their information. As the depth and quality of information available in electronic format continues to increase, digital libraries may be able to provide all of the resources that the students need. It will merit careful study by future researchers.

There has not been enough research on equity of support services between distance education students and campus-based students. As stated previously, one of the measures of the quality of an educational institution is its library. This important feature was mentioned by some of the respondents to the surveys. If the same services are not available to all students, there is an inequity in quality. Comparative studies are needed to determine if equal library services can be provided to both groups of students.

As has been mentioned before, more research needs to be performed on the validity of electronic surveys. The surveys conducted in this inquiry had a low response rate. Adapting standard survey instruments to the electronic environment, and eventually to the World Wide Web, will allow for much broader based surveying and faster return and compilation of results. Detailed research comparing the methods will be interesting and necessary for future academic research.

Summary

Distance education is growing in importance in the academic environment and also within industry. Many institutions are turning to distance education methods as a way to reach a larger and more diverse population. This presents a challenge to the institutions

to provide traditional services and resources in a new way through the use of new technologies.

The role of the library in the distance education institution is undergoing huge changes in order to support the needs of the distance education student (Aguilar & Kascus, 1991b). Sophisticated communications technologies are making it possible to provide information and research capabilities to students regardless of their location (Kopp, 1991). The importance of the library in the educational process must continue to be evaluated.

There is much recent historical and descriptive literature on the theories and process of educating students at a distance (Keegan, 1990; Willis, 1993). While much is written on the techniques of teaching and learning, there is little background on the various services required to support a distance education population. Although educators seem to be ignoring library support, the library community is taking the lead in developing new methods to serve this important sector of the academic world (Latham, Slade & Budnick, 1991). Technology is having a large impact on libraries and is unifying the services that can be provided to students, regardless of their location. Through the use of telecommunications technology and digital storage of information, information services can be provided to all students, regardless of their lack of physical access to the campus library.

According to the literature in the library and information science field, library services are changing rapidly in response to the changing needs of the users (Adams, 1995). There is an increasing move to the virtual or electronic library. Any such move must be based on the actual needs of the library users. The move to the electronic virtual

library will change the look of the library and may have an impact on its cultural significance in the academic environment. Electronic products are being developed that assist librarians in providing services to all users. The Digital Library Initiative illustrates several projects underway to explore new library services delivered in new ways (Schatz & Chen, 1996).

Some librarians are truly moving far ahead of tradition to provide services to their patrons. New interfaces to library collections have been developed by institutions such as those at Dartmouth College (*DCIS/WWW*, 1996) and the University of Chicago (*About Lib Info*, 1997). Libraries such as the UCLA Library (UCLA Library, 1997) are using the Internet and the World Wide Web as a new way to reach the users. Some libraries are developing guides to the World Wide Web for the use of the students and faculty. Several experimental projects are currently being pursued to investigate the use of the Internet, the World Wide Web, multimedia communications, and electronic mail to discover new ways to gather store, organize, and deliver digital information (The Electronic Text Center, 1996).

In this environment of constant change, the role of the librarian in education is also being clarified (Buckland, 1992; Garrison, 1994; Hunt, 1995). While the librarian has often been seen as the keeper of the books, new technologies are forcing a change in this traditional role. Librarians have a new role to play in the integration of networked information into traditional print and multimedia sources (Young, 1996). Information technology is allowing librarians to deliver a broader base of services to users. This same evolving technology is also forcing a change in the skills that librarians must possess to maintain the new style of library collection (Charkes, 1995). Librarians must base their

new skill set and their new role in the educational process on the actual needs of their users.

Surveys are an excellent way to gather information from a large group of users. A survey can be used to assess the needs of the users and to measure their level of satisfaction with existing services. Surveys are regularly used in libraries to determine the needs of the library patrons (Adams & Beck, 1995). Sample surveys from the library field were reviewed in order to develop the surveys used in this research.

In this study the researcher has evaluated the information needs of a segment of the distance learning graduate student population at Nova Southeastern University. The needs and information seeking behaviors of the students, faculty, and administration in the School of Computer and Information Sciences, the Fischler Center for the Advancement of Education, the Center for Psychological Studies, the School of Social and Systemic Studies, and the School of Business and Entrepreneurship were studied through the use of a series of surveys.

An initial survey addressed where students are finding the information they need to complete their course work, how they are learning to find the information they need, and their own perceptions regarding their research skills. Two additional surveys, one sent to the students and another sent to the faculty, served to evaluate the satisfaction of the users with their current library services. Based upon the results of these surveys, a new role for the library and the librarians has been investigated.

The surveys were distributed and collected through electronic mail. While this can be a cost effective and fast way to communicate with a large survey population, there are many problems created when using this technology for survey distribution and response

(Berge & Collins, 1996). Electronic mail surveys do not have a high response rate. They also have the danger of selecting a more technologically sophisticated response group. Only those individuals with access to the technology required can receive and respond to the survey.

The survey responses were assessed using a methodology that is becoming more popular in manufacturing and management environments, Quality Function Deployment (QFD). QFD gathers and analyses the input of the users so that this input can have a direct impact on improving the quality of a product or service (Quinlan & Byrne, 1995). The greatest advantage of QFD is the graphical display of information that makes it very easy to gauge the satisfaction level of the users. QFD is a proactive methodology that adapted well to this study.

The results of the surveys indicate that students in distance education programs have a recognized need for information to supplement their course work. Many of the students have difficulty in locating the information they require. A large percentage of the students are turning to the Internet as a primary information resource. The students seem to sense a strong association between information in general and library resources. Although two different versions of the survey were used, one indicating that the survey was being conducted for the library and the other only asking for the information needs of the students, the results from the two versions are similar.

Although the surveys indicate that many students are using the Internet as their primary information resource and most of the students are using the Internet in some way in their course work, a large number of these students seem to be finding their own way in the information maze that is developing on the Internet. When asked where they learned

their skills, a majority responded that they are self-taught. This does not reflect adequate training for effective information seeking behavior.

The library satisfaction surveys revealed that the faculty and students are satisfied with the library services to which they have access. The surveys revealed that more marketing efforts would help the Einstein Library to reach a larger percentage of the distance education students and faculty with the important new services they are developing.

A new model of library service was developed that places the library and librarians at the center of a balanced information universe. This model was based upon a planning document provided by Nova Southeastern University, but could be adopted by any library. The model suggests new directions for providing service to distance education students. This will in turn create new roles for librarians as teachers, technologists, and implementors of new services.

Emerging technologies will add new possibilities for information delivery, but will also create challenges for librarians. There are many avenues for additional research into the emerging paths to information and methods that can enable librarians to serve as mentors for their users.

Appendix A

Library Survey

STUDENT SURVEY

Please assist a fellow NSU student in her dissertation study. The Einstein Library at Nova Southeastern University (NSU) is trying to find new ways to serve the distance education students in your program. Please assist us in improving library services by completing the following brief survey. Your answers will be anonymous. The researcher will strip your identity from the responses when they are received. To complete the survey, please select "R" to reply to this message including the text of the message in your reply and then edit the document to indicate your responses. Instructions for forwarding your responses to the researcher are included at the end of the survey.

Place an "X" or other mark beside your answers below or answer the question as completely as possible.

1. Using computers, I consider myself a(n):

___ beginner
___ intermediate
___ advanced intermediate
___ expert

2. Using email, I consider myself a(n):

___ beginner
___ intermediate
___ advanced intermediate
___ expert

3. My age group is:

___ under 20
___ 20-29
___ 30-39
___ 40-49
___ 50-59
___ over 59

4. My gender:

___ Female
___ Male

5. I am a student in:

___ SCIS
___ CPS/SSSS
___ FCAE
___ SBE

6. I am:

___ a doctoral student
___ a masters student
___ a postgraduate student (no degree program)
___ an undergraduate student

7. I have been in my program:

___ less than 1 year
___ 1 year-less than 2 years
___ 2 years-less than 3 years
___ 3 years or more

8. I attend (please read through selections in order to make the appropriate choice):

___ Cluster sessions on campus at NSU
(3 days or less-several meeting each year)
___ Institutes on campus at NSU
(week long sessions-at least twice each year)
___ Cluster sessions at NSU branch location
(3 days or less-several meeting each year)
___ Institutes at NSU branch location
(week long sessions-at least twice each year)
___ Regular classes on the NSU campus
___ No sessions on the NSU campus or a branch location

9. I access the NSU Computing System from (mark all that apply):

___ Home
___ Work
___ NSU Computing Lab
___ Other (please specify) _____

10. I access the NSU Computing Systems using:

___ Local Internet Service Provider
___ NSU provided telecommunications link (AT&T IAS)
___ NSU Microcomputer Lab
___ Direct dial to the NSU campus
___ Don't know

11. Please indicate your primary source for research information outside the materials required for your course work (please select only one):

___ Personal Visits to the Einstein Library at NSU
___ Distance Library Services (phone/fax/email) provided by NSU
___ Personal visits to another library at NSU (please specify) _____
___ Local Library
___ Internet/World Wide Web
___ Personal Collection
___ Library at Work
___ Friends
___ Other (please specify) _____

12. For the primary source for research information selected above, please state who taught you how to use that resource or how you obtained the knowledge necessary to use that resource:

_____

13. When you access your primary source for research information, please rate your success:

___ Never find what I need
___ Find what I need less that 50% of the time
___ It's 50/50
___ Find what I need more than 50% of the time
___ Always find what I need

14. The last time you used your primary source for research information, was your search successful?

___ yes
___ no
___ don't remember

15. How important do you think library skills are for you to complete your course work?

___ unimportant
___ somewhat
___ important
___ important
___ very important
___ no opinion

16. Please rate your ability to locate the following by placing a mark before the appropriate response:

Books .....___Excellent___Good___Fair___Poor___Don't know

Journal articles.....___Excellent___Good___Fair___Poor___Don't know

Newspaper articles....___Excellent___Good___Fair___Poor___Don't know

Reference tools.....___Excellent___Good___Fair___Poor___Don't know

Conference proceedings___Excellent___Good___Fair___Poor___Don't know

Web sites.....___Excellent___Good___Fair___Poor___Don't know

Recent research.....___Excellent___Good___Fair___Poor___Don't know

17. How many times have you been assigned a paper, report, project or presentation at NSU which required library research?

___ never
___ at least once
___ once each semester or term
___ several each semester or term

18. Please list three major journals or other information resources in your field of research:

_____

_____

_____

19. How do you locate information in these journals or information resources?

_____

_____

20. How often do you physically visit the Einstein Library at NSU during a typical semester or term?

___ Never
___ Once
___ Several times
___ Often

21. Do you use any other libraries on campus at NSU?

___ no
___ yes
which ones?:_____

22. How often do you visit any library during a typical semester or course?

___ Never
___ Once
___ Several times
___ Often

23. How often do you access a library electronically during a typical semester or term?

___ Daily
___ Weekly
___ Monthly
___ Seldom
___ Never

23. How would you rate your library skills?
(Please place a mark before your response)

___ Superior
___ Good
___ Average
___ Have some problems
___ Poor

24. Have you ever accessed information on the Internet/WWW for your course work (please read the selections carefully before making your selection)?

___ yes
___ no, I don't need to
___ no, but I am going to learn
___ no, I don't know how

25. In order to search on the World Wide Web, I use:

___ Lynx
___ Netscape
___ Microsoft Explorer
___ Mosaic
___ Other graphical browser
___ Have not tried
___ Don't know

26. Please mark the statement that most accurately describes your current practice. When accessing information on the Internet and/or World Wide Web:

___ I read the information from the screen and never print to paper.
___ I print everything to paper to read later and file.
___ I print some things and read some things from the screen.

Please feel free to add any additional comments in the space provided following the survey that you would like to communicate anonymously to the Einstein Library at NSU. Please indicate by placing a mark here _____ if you grant permission to submit your comments anonymously to the NSU Library and the program directors at the conclusion of this study. These comments will be compiled and will not in any way reveal your identity.

When you have completed your responses, please send them by using <Control-X>, as you do with other email messages.
If you prefer to print the survey and mail your results, please use the following address: Anne K. Abate, 12031 Southwick Lane, Cincinnati, Ohio 45241. Unfortunately, there is no way to reimburse you for postage.
Thank you for your cooperation.

Appendix B

Information Survey

STUDENT SURVEY

Please assist a fellow NSU student in her dissertation study. We are trying to determine how students locate information and research materials for their courses at Nova Southeastern University (NSU). Your responses will contribute to the future of your academic program. Your answers will be anonymous. The researcher will strip your identity from the responses when they are received. To complete the survey, please select "R" to reply to this message including the text of the message in your reply and then edit the document to indicate your responses. Instructions for forwarding your responses to the researcher are included at the end of the survey.

Please place an "X" or other mark in front of your answers below or answer the question as completely as possible.

1. Using computers, I consider myself a(n):

___ beginner
___ intermediate
___ advanced intermediate
___ expert

2. Using email, I consider myself a(n):

___ beginner
___ intermediate
___ advanced intermediate
___ expert

3. My age group is:

___ under 20
___ 20-29
___ 30-39
___ 40-49
___ 50-59
___ over 59

4. My gender:

___ Female
___ Male

5. I am a student in:

___ SCIS
___ CPS/SSSS
___ FCAE
___ SBE

6. I am:

___ a doctoral student
___ a masters student
___ a postgraduate student (no degree program)
___ an undergraduate student

7. I have been in my program:

___ less than 1 year
___ 1 year-less than 2 years
___ 2 years-less than 3 years
___ 3 years or more

8. I attend (please read through selections in order to make the appropriate choice):

___ Cluster sessions on campus at NSU
(3 days or less-several meeting each year)
___ Institutes on campus at NSU
(week long sessions-at least twice each year)
___ Cluster sessions at NSU branch location
(3 days or less-several meeting each year)
___ Institutes at NSU branch location
(week long sessions-at least twice each year)
___ Regular classes on the NSU campus
___ No sessions on the NSU campus or a branch location

9. I access the NSU Computing Systems from (mark all that apply):

___ Home
___ Work
___ NSU Computing Lab
___ Other (please specify) _____

10. I access the NSU Computing Systems using:

___ Local Internet Service Provider
___ NSU provided telecommunications link (AT&T IAS)
___ NSU Microcomputer Lab
___ Direct dial to the NSU campus
___ Don't know

11. In order to search on the World Wide Web, I use:

___ Lynx
___ Netscape
___ Microsoft Explorer
___ Mosaic
___ Other graphical browser (please specify) _____
___ Have not tried
___ Don't know

12. Please mark the statement that most accurately describes you current practice. When accessing information on the Internet and/or World Wide Web:

___ I read the information from the screen and never print to paper.
___ I print everything to paper to read later and file.
___ I print some things and read some things from the screen.

13. Please indicate your primary source for research information outside the materials required or supplied for your course work (please select only one):

___ Internet/World Wide Web
___ Local Library
___ Personal visits to the Einstein Library at NSU
___ Distance Library Services (DLS) provided by NSU
___ Personal visits to another library at NSU (please specify) _____
___ Personal Collection
___ Library at Work
___ Friends
___ Other (please specify) _____

14. For the primary source for research information selected above, please state who taught you how to use that resource or how you obtained the knowledge necessary to use that resource:

_____

15. When you access your primary source for research information, please rate your success:

___ Never find what I need
___ Find what I need less that 50% of the time
___ It's 50/50
___ Find what I need more than 50% of the time
___ Always find what I need

16. The last time you used your primary source for research information, was your search successful?

___ yes
___ no
___ don't remember

17. How important do you think research skills are for you to complete your course work?

___ unimportant
___ somewhat important
___ important
___ very important
___ no opinion

18. Please rate your ability to locate the following by placing a mark before the appropriate response:

Books .....___Excellent___Good___Fair___Poor___Don't know

Journal articles.....___Excellent___Good___Fair___Poor___Don't know

Newspaper articles....___Excellent___Good___Fair___Poor___Don't know

Reference tools.....___Excellent___Good___Fair___Poor___Don't know

Conference proceedings___Excellent___Good___Fair___Poor___Don't know

Web sites.....___Excellent___Good___Fair___Poor___Don't know

Recent research.....___Excellent___Good___Fair___Poor___Don't know

19. How many times have you been assigned a paper, report, project or presentation at NSU which required research?

___ never
___ at least once
___ once each semester or term
___ several each semester or term

20. Please list three primary information resources in your field of research:

1. _____

2. _____

3. _____

21. How do you locate information in these information resource?

_____

_____

22. Have you ever accessed information on the Internet/WWW for your course work (please read the selections carefully before making your selection)?

___ yes
___ no, I don't need to
___ no, but I am going to learn
___ no, I don't know how

23. How would you rate your information seeking skills?

___ Superior
___ Good
___ Average
___ Have some problems
___ Poor

24. How often do you physically visit a library during a typical semester or term?

___ Daily
___ Weekly
___ Monthly
___ Seldom
___ Never

25. How often do you access a library electronically during a typical semester or term?

___ Daily
___ Weekly
___ Monthly
___ Seldom
___ Never

Please feel free to add any additional comments in the space following the survey regarding your ability to locate the information you need to complete your course work. Please indicate by placing a mark here _____ if you grant permission to submit your comments anonymously to your program director at the conclusion of this study. These comments will be compiled and will not in any way reveal your identity.
When you have completed your responses, please send them by using <Control-X>, as you do with other email messages.

If you prefer to print the survey and mail your results, please use the following address: Anne K. Abate, 12031 Southwick Lane, Cincinnati, Ohio 45241. Unfortunately, there is no way to reimburse you for postage.
Thank you for your cooperation.

Appendix C

Faculty Library Survey

FACULTY LIBRARY SURVEY

Some of you may have reviewed the student survey of information gathering conducted last month. This survey is a continuation of that research. Please take a few minutes to respond to the following questions. Your responses will be compiled and provided to the administration of the Einstein Library.

Some questions will ask you to type out a response, others will ask you to place a mark before the appropriate response. You should be able to reply to this message, include a copy of this message in the reply, and mark your responses on that copy. When you have completed your answers, please email the reply. The address to which you are responding is: abate1@scis.nova.edu.

SURVEY OF LIBRARY SERVICES

In what location do you teach classes for NSU (City and State)?

In which NSU program do you teach (place a mark before the appropriate response)?

SCIS
CPS
SSSS
SBE
PET
PHE
EDL
LSCA
Other (please identify)

How many papers, reports or presentations do you assign each semester or term which require use of the library (please provide a number or range)?

Would it be possible for students to complete these assignments and receive a passing grade without using a library (please place a mark before your response)?

YES
NO
I'M NOT SURE

To your knowledge, do your students use NSU library resources and services to complete these assignments (please place a mark before your response)?

YES
NO
I'M NOT SURE

To your knowledge, are students using other libraries outside NSU to complete these assignments (please place a mark before your response)?

YES
NO
I DON'T KNOW

Is a library instruction session conducted by the NSU library staff included in the curriculum or the orientation sessions for the program in which you teach (please place a mark before your response)?

YES
NO
I DON'T KNOW

Have you ever attended a library instruction program taught by an NSU librarian (please place a mark before your response)?

YES
NO

To your knowledge, do your students use the Internet to complete the assignments in your courses (please place a mark before your response)?

YES
NO
I'M NOT SURE

Do you encourage the use of the Internet to complete your assignments (please place a mark before your response)?

YES
NO
I DON'T ENCOURAGE OR DISCOURAGE

Do you use the services and resources of the NSU Einstein Library?

YES
NO

If you answered yes, what is your overall level of satisfaction with the NSU Einstein Library?

COMPLETELY SATISFIED
SATISFIED
NEUTRAL
UNSATISFIED
COMPLETELY UNSATISFIED

Do you use the services of the Distance Library Services Department (please place a mark before your response)?

YES
NO

If you answered yes, what is your overall level of satisfaction with the Distance Library Services Department (please place a mark before your response)?

COMPLETELY SATISFIED
SATISFIED
NEUTRAL
UNSATISFIED
COMPLETELY UNSATISFIED

What are you MOST satisfied with?

What are you LEAST satisfied with?

If you answered yes to the questions above, which services do you use (place a mark in front of all that apply)?

Access to the book collection
Access to periodical indexes
Online access to journal and periodical articles
Reference assistance and guidance
Interlibrary Loan services
Other (please list)

What types of library services do you consider necessary for students to have available (place a mark in front of all that apply)?

Access to an academic book collection
Access to the NSU Einstein Library
Access to periodical indexes
Online access to journal and periodical articles
Instruction on how to use libraries
Reference assistance and guidance
Interlibrary Loan services
Other (please list)

How many times each semester or term do you use other libraries (academic, public, corporate), other than NSU libraries, to conduct research or prepare class assignments (place a mark in front of your response)?

0
1-2
2-5
6-10
11 or more

Please list the libraries you usually use.

If you use other libraries, what types of library services do you use at these libraries (place a mark in front of all that apply)?

Access to the book collection
A quiet place to research and study
Access to periodical indexes
Online access to journal and periodical articles
Reference assistance and guidance
Interlibrary Loan services
Other (please list)

Do you create your own Web pages for use by your students?

YES
NO
NOT YET, BUT I'M WORKING ON IT

If you answered yes to the above question, does your Web page include pointers to locating information for assignments?

YES
NO

Would you be willing to collaborate with the library to add links to your Web page on how to locate materials?

YES, HAVE THEM CONTACT ME
NO

Is there anything else that the Einstein Library could do in order to help your students in their program? (Please feel free to give a brief answer, or an elaborate one. Your comments will be provided to the Library at the conclusion of this study.)

Thank you for your assistance. You may now send your reply. These results will be compiled and presented to the Library so that they can keep working to serve you and your students better.

Appendix D

Faculty Library Survey Responses

FACULTY LIBRARY SURVEY

Some of you may have reviewed the student survey of information gathering conducted last month. This survey is a continuation of that research. Please take a few minutes to respond to the following questions. Your responses will be compiled and provided to the administration of the Einstein Library.

Some questions will ask you to type out a response, others will ask you to place a mark before the appropriate response. You should be able to reply to this message, include a copy of this message in the reply, and mark your responses on that copy. When you have completed your answers, please email the reply. The address to which you are responding is: abate1@scis.nova.edu.

SURVEY OF LIBRARY SERVICES

In what location do you teach classes for NSU (City and State)?

22	Fort Lauderdale vicinity
2	Florida
6	Other U.S.
2	Outside U.S.
8	Blank

In which NSU program do you teach (place a mark before the appropriate response)?

14	SCIS
6	CPS
3	SSSS
6	SBE
2	PET
1	PHE
0	EDL
4	LSCA
4	Other (please identify)

How many papers, reports or presentations do you assign each semester or term which require use of the library (please provide a number or range)?

0	0
17	1-2 papers
13	3-4 papers
9	4 + papers
1	no response

Would it be possible for students to complete these assignments and receive a passing grade without using a library (please place a mark before your response)?

9	YES
29	NO
1	I'M NOT SURE
1	no response

To your knowledge, do your students use NSU library resources and services to complete these assignments (please place a mark before your response)?

26	YES
4	NO
8	I'M NOT SURE
2	no response

To your knowledge, are students using other libraries outside NSU to complete these assignments (please place a mark before your response)?

32	YES
1	NO
6	I DON'T KNOW
1	no response

Is a library instruction session conducted by the NSU library staff included in the curriculum or the orientation sessions for the program in which you teach (please place a mark before your response)?

24	YES
6	NO
9	I DON'T KNOW
1	no response

Have you ever attended a library instruction program taught by an NSU librarian (please place a mark before your response)?

18	YES
17	NO
5	no response

To your knowledge, do your students use the Internet to complete the assignments in your courses (please place a mark before your response)?

36	YES
2	NO
2	I'M NOT SURE

Do you encourage the use of the Internet to complete your assignments (please place a mark before your response)?

32	YES
1	NO
6	I DON'T ENCOURAGE OR DISCOURAGE
1	no response

Do you use the services and resources of the NSU Einstein Library?

36	YES
3	NO
1	no response

If you answered yes, what is your overall level of satisfaction with the NSU Einstein Library?

8	COMPLETELY SATISFIED
20	SATISFIED
5	NEUTRAL
1	UNSATISFIED
1	COMPETELY UNSATISFIED

Do you use the services of the Distance Library Services Department (please place a mark before your response)?

26	YES
14	NO

If you answered yes, what is your overall level of satisfaction with the Distance Library Services Department (please place a mark before your response)?

9	COMPLETELY SATISFIED
12	SATISFIED
3	NEUTRAL
1	UNSATISFIED
1	COMPETELY UNSATISFIED

What are you MOST satisfied with?

What are you LEAST satisfied with?

If you answered yes to the questions above, which services do you use (place a mark in front of all that apply)?

30	Access to the book collection
28	Access to periodical indexes
33	Online access to journal and periodical articles
13	Reference assistance and guidance
26	Interlibrary Loan services
	Other (please list)
	Other universities' libraries
	Getting copies of dissertations from other libraries
	Computer searches/research

What types of library services do you consider necessary for students to have available (place a mark in front of all that apply)?

34 Access to an academic book collection
27 Access to the NSU Einstein Library
35 Access to periodical indexes
34 Online access to journal and periodical articles
31 Instruction on how to use libraries
32 Reference assistance and guidance
33 Interlibrary Loan services
Other (please list)
- Fax back article service
- Internet access from the Library
- Internet guide and reference
- Internet bookstores
- Distance learning material
- Respectable library in terms of volumes
- Getting dissertations for doctoral students
- Computer search services
- Instruction in online access (students and faculty)

How many times each semester or term do you use other libraries (academic, public, corporate), other than NSU libraries, to conduct research or prepare class assignments (place a mark in front of your response)?

10 0
9 1-2
5 2-5
7 6-10
8 11 or more

Please list the libraries you usually use.

If you use other libraries, what types of library services do you use at these libraries (place a mark in front of all that apply)?

23 Access to the book collection
9 A quiet place to research and study
15 Access to periodical indexes
17 Online access to journal and periodical articles
10 Reference assistance and guidance
9 Interlibrary Loan services
Other (please list)
Current awareness profiled literature searches
Direct access to journals
Special research privileges
Access to less well-known journals, newsletters
Alumni services
Data base searches

Do you create your own Web pages for use by your students?

17 YES
12 NO
11 NOT YET, BUT I'M WORKING ON IT

If you answered yes to the above question, does your Web page include pointers to locating information for assignments?

15 YES
7 NO
18 NO RESPONSE

Would you be willing to collaborate with the library to add links to your Web page on how to locate materials?

19 YES, HAVE THEM CONTACT ME
7 NO
14 NO RESPONSE

Is there anything else that the Einstein Library could do in order to help your students in their program? (Please feel free to give a brief answer, or an elaborate one. Your comments will be provided to the Library at the conclusion of this study.)
Thank you for your assistance. You may now send your reply. These results will be compiled and presented to the Library so that they can keep working to serve you and your students better.

Appendix E

Student Library Satisfaction Survey

FOLLOW-UP STUDENT SURVEY

All of you participated in the student survey of information gathering conducted last month. You may or may not have realized that survey was being conducted in order to study the future of library services at NSU. Because of your willing response to that survey, you have been selected to receive this shorter, follow-up survey. Please take a few minutes to respond to the following questions. Your responses will be compiled and provided to the administration of the Einstein Library.

Some questions will ask you to type out a response, others will ask you to place a mark before the appropriate response. You should be able to reply to this message, include a copy of this message in the reply, and mark your responses on that copy. When you have completed your answers, please email the reply. The address to which you are responding is: abate1@scis.nova.edu.

EINSTEIN LIBRARY STUDENT USER SATISFACTION SURVEY

Where do you attend classes (City and State)?

Have you used the NSU Einstein Library or the Library on the East Campus or Library Services provided through Distance Library Services (please place a mark before your response)?

YES
NO

Have you attended a training session in the use of NSU library and information services (please place a mark before your response)?

YES
NO

If yes, who conducted that session (please place a mark before your response)?

NSU Computer Services Staff
NSU Faculty
NSU Library Staff
Other (please specify)_____
I don't know

For each question below, please place a mark before your correct response.

Are you aware that NSU Einstein Library offers:

Library instruction session taught by an NSU library staff member?
YES
NO

A regular schedule of hands-on training sessions at the Library?
YES
NO

A video explaining their services?
YES
NO

A toll-free number for reference and research assistance?
YES
NO

Computer access to the library catalog?
YES
NO

The ability to request books through the online system?
YES
NO

The ability to request articles and ERIC documents?
YES
NO

A Web-based access to their services?
YES
NO

The ability to borrow books from other libraries through contract and interlibrary loan arrangements?
YES
NO

The ability to search online databases through the Nova online system?
YES
NO

Delivery of library materials through the mail?

YES
NO

A small library collection at the East Campus?

YES
NO

What is your overall level of satisfaction with the NSU Einstein Library (please place a mark before your response)?

Competely satisfied
Satisfied
Neutral
Unsatisfied
Completely unsatisfied

What is your overall level of satisfaction with Distance Library Services (please place a mark before your response)?

Competely satisfied
Satisfied
Neutral
Unsatisfied
Completely unsatisfied

What are you MOST satisfied with?

What are you LEAST satisfied with?

Would you be interested in Web-based tutorials on locating information and using the resources of the Nova Library?

YES
NO

If you answered yes to the above question, how much time would you be willing to spend going through such a tutorial?

What is your overall impression of the services offered by the NSU Einstein Library (please make a brief comment if possible)?

Please feel free to add and suggestions or comments you may have about current library services or additional services that should be available to NSU students.

Thank you for your assistance. You may now send your reply. These results will be compiled and presented to the Library so that they can keep working to serve you better.

Appendix F

Student Library Satisfaction Survey Responses

FOLLOW-UP STUDENT SURVEY

All of you participated in the student survey of information gathering conducted last month. You may or may not have realized that survey was being conducted in order to study the future of library services at NSU. Because of your willing response to that survey, you have been selected to receive this shorter, follow-up survey. Please take a few minutes to respond to the following questions. Your responses will be compiled and provided to the administration of the Einstein Library.

Some questions will ask you to type out a response, others will ask you to place a mark before the appropriate response. You should be able to reply to this message, include a copy of this message in the reply, and mark your responses on that copy. When you have completed your answers, please email the reply. The address to which you are responding is: abate1@scis.nova.edu.

EINSTEIN LIBRARY STUDENT USER SATISFACTION SURVEY

Where do you attend classes (City and State)?

14	Fort Lauderdale vicinity
3	Florida
12	Other U.S.
2	Outside U.S.

Have you used the NSU Einstein Library or the Library on the East Campus or Library Services provided through Distance Library Services (please place a mark before your response)?

27	YES
7	NO

Have you attended a training session in the use of NSU library and information services (please place a mark before your response)?

18	YES
16	NO

If yes, who conducted that session (please place a mark before your response)?

3	NSU Computer Services Staff
3	NSU Faculty
11	NSU Library Staff
0	Other (please specify)_____
1	I don't know

For each question below, please place a mark before your correct response.

Are you aware that NSU Einstein Library offers:

Library instruction session taught by an NSU library staff member?

13	YES
21	NO

A regular schedule of hands-on training sessions at the Library?

3	YES
31	NO

A toll-free number for reference and research assistance?

18	YES
16	NO

Computer searches to provide a bibliography in your area of research?

18	YES
16	NO

Computer access to the library catalog (NOVACAT)?

28	YES
6	NO

The ability to request books through the online system?

26	YES
8	NO

The ability to request articles and ERIC documents?

29	YES
5	NO

Computer access to full-text journal articles?

25 YES
9 NO

A Web-based access to their services?

16 YES
18 NO

An Internet jump start page divided by topic?

9 YES
25 NO

The ability to borrow books from other libraries through contract and interlibrary loan arrangements?

29 YES
5 NO

The ability to search online databases through the Nova online system?

27 YES
7 NO

The ability to communicate electronically with a librarian?

22 YES
12 NO

Delivery of library materials through the mail?

28 YES
6 NO

A small library collection at the East Campus?

8 YES
26 NO

What is your overall level of satisfaction with the NSU Einstein Library (please place a mark before your response)?

8 Competely satisfied
5 Satisfied
14 Neutral
5 Unsatisfied
1 Completely unsatisfied
1 no response

What is your overall level of satisfaction with Distance Library Services (please place a mark before your response)?

9	Competely satisfied
9	Satisfied
11	Neutral
1	Unsatisfied
2	Completely unsatisfied
2	no response

What are you MOST satisfied with?

What are you LEAST satisfied with?

Would you be interested in Web-based tutorials on locating information and using the resources of the Nova Library?

24	YES
10	NO

If you answered yes to the above question, how much time would you be willing to spend going through such a tutorial?

2	10-15 minutes
2	16-29 minutes
3	1/2 hour
16	16 whatever it takes
11	no response

What is your overall impression of the services offered by the NSU Einstein Library (please make a brief comment if possible)?

Please feel free to add and suggestions or comments you may have about current library services or additional services that should be available to NSU students.

Thank you for your assistance. You may now send your reply. These results will be compiled and presented to the Library so that they can keep working to serve you better.

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